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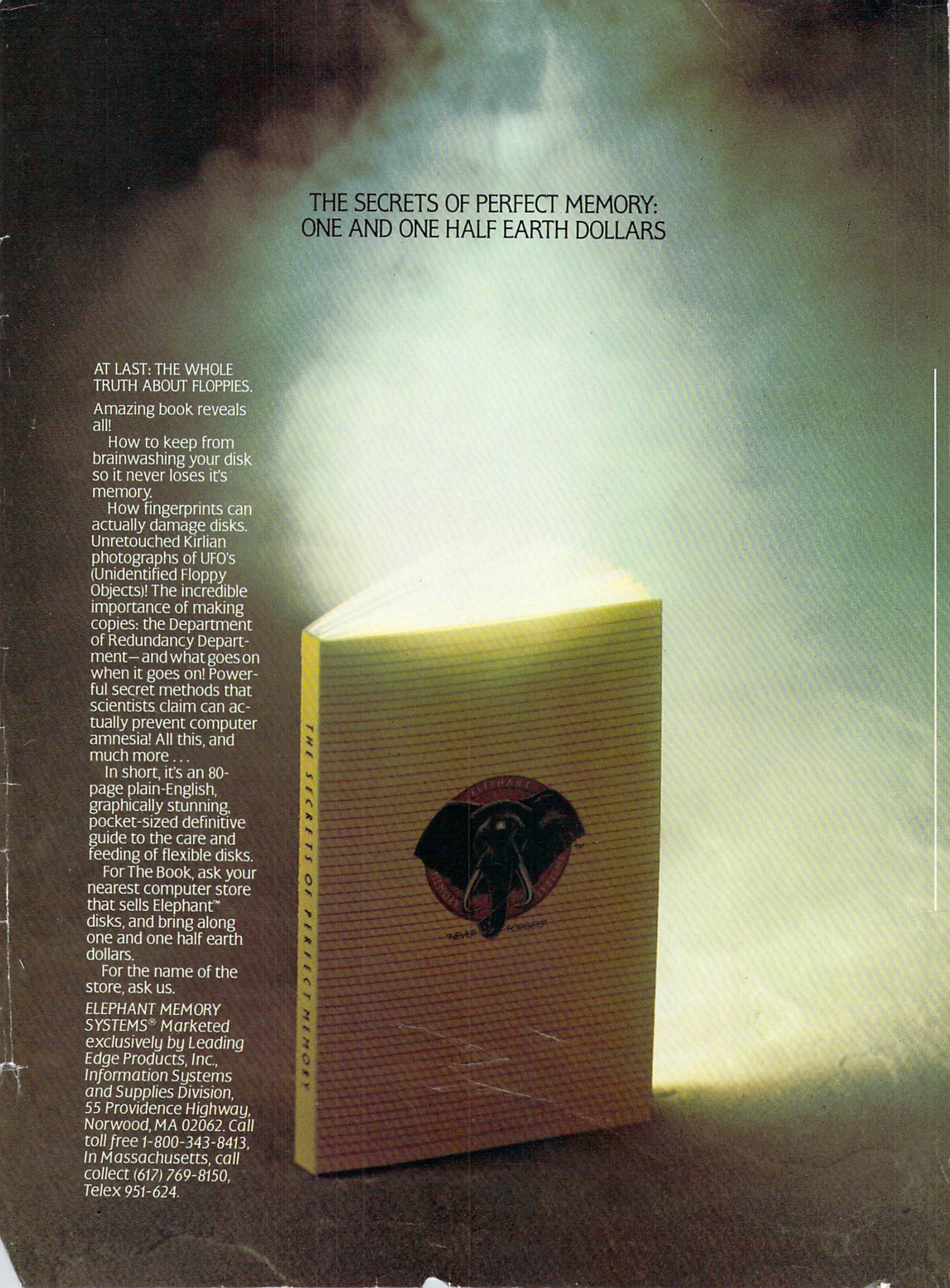
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Games for Two . . . or Ten A rundown of games you can play with a crowd.

Things Computer Salespeople Seldom Tell You

Buyer's Guide To Joysticks and Other Hand-Controllers

Ten Things Your Computer Wants for Christmas

PLUS: Special Holiday programs; Hardware and Software reviews; and MORE

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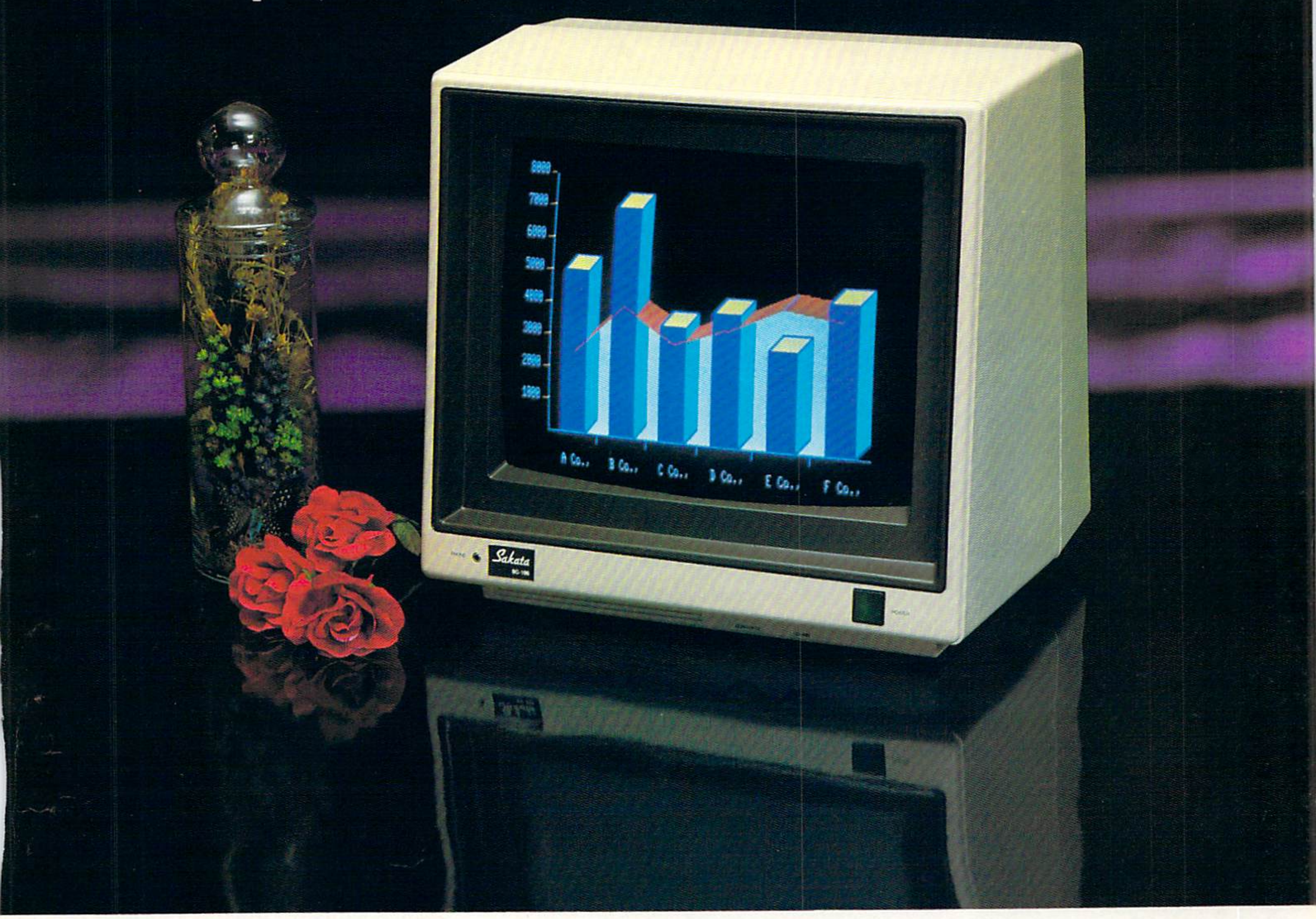

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EDITOR'S NOTE

NOVEMBER— A MONTH FOR FAMILIES

For me, November means Thanksgiving, my favorite holiday. When I think back on childhood Thanksgivings I remember only good times. If there were fights among us children, they were unimportant. If the adults argued over who would carve the turkey, they must have quickly decided, for I have no memories of such squabbles.

All I remember is feeling warm and good. There were no anxieties over presents—what to give, what to say. The only gifts were ourselves. We were together and we were happy and filled with joy.

This Thanksgiving, all of us on the staff of FAMILY COMPUTING are part of a new family. It would seem impossible to match the memories of my childhood. Unbelievably it is not. Few of the members of this new family have known any of the others long, but we're working toward a common goal, sharing experiences and laughs, worries and even disasters—much like any family.

We've been together long enough to know who pushes deadlines, who frets (unnecessarily), who's the perfectionist, who pouts, who's the most stubborn, who makes everything seem all right, who remembers every detail (and who forgets), who's messy and who's neat, who leaves food and soft drinks in the computer lab, who can't get through the day without chocolate, who's always early, and who's always late, and who will hate this "sappy" note.

Almost miraculously, it all works. No one gets angry enough to shout, no one seems perpetually annoyed, no one seems unwilling to help out. Almost no one complains about walking down 12 flights of stairs every night because the elevator power in the building shuts off at 6:30, and few magazine people leave work while it's still light. Everyone is amazingly generous—we are together, doing work we love, and the feelings are good.

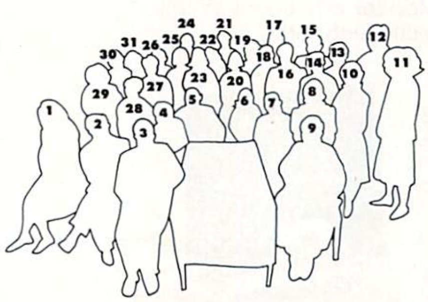
If you look at the masthead on p. 6, you'll see all our names. And as you turn the pages of each issue, you'll see our work—the words and the pictures, the ads and the paper, even the subscription card that falls out of the magazine every month. Someone is responsible for each of the elements that make it possible for FAMILY COMPUTING to exist, to stay healthy, and to grow.

You, of course, will be part of our growth, as we hope to become part of your families and for you to become part of ours. We hope our ideas bring you pleasure and satisfaction with your computer and that you share your favorite ideas with us and our other readers.

It is November. I have a new family and a future of new memories. And I am thankful.

Claudia Cohl

CLAUDIA COHL
EDITOR-IN-CHIEF



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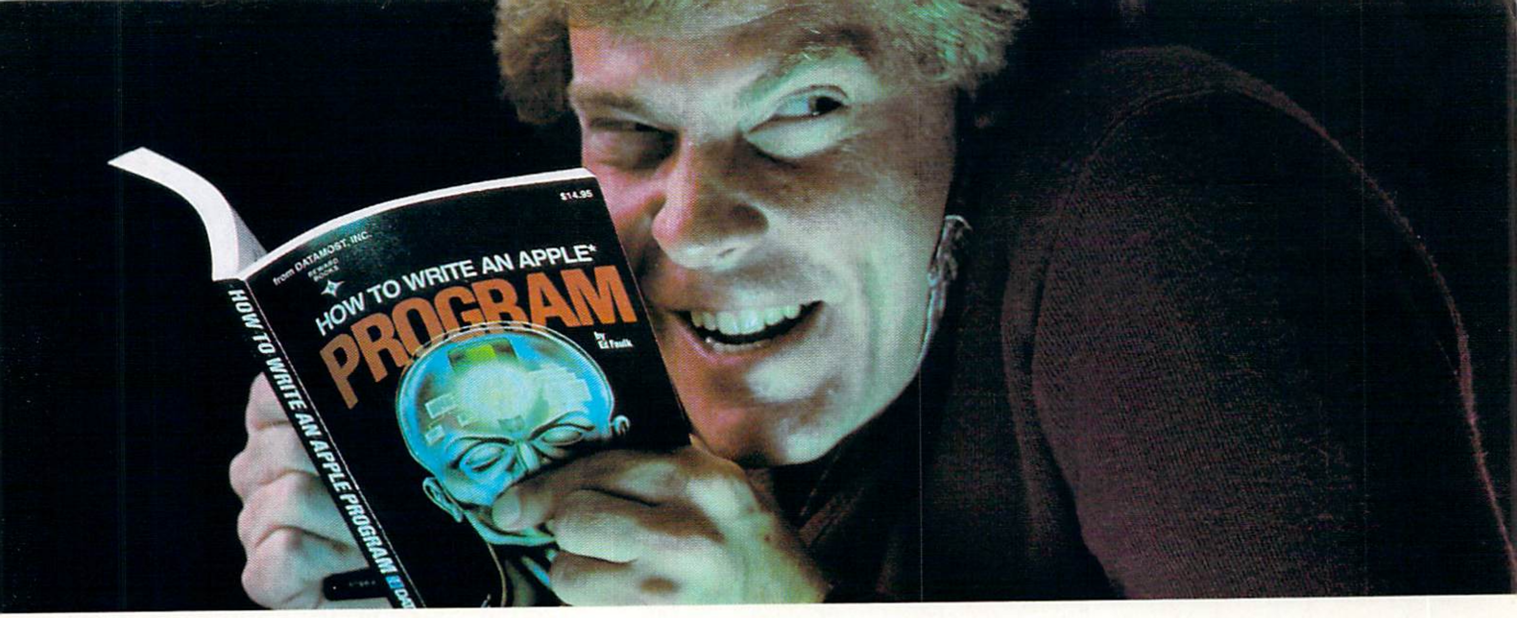

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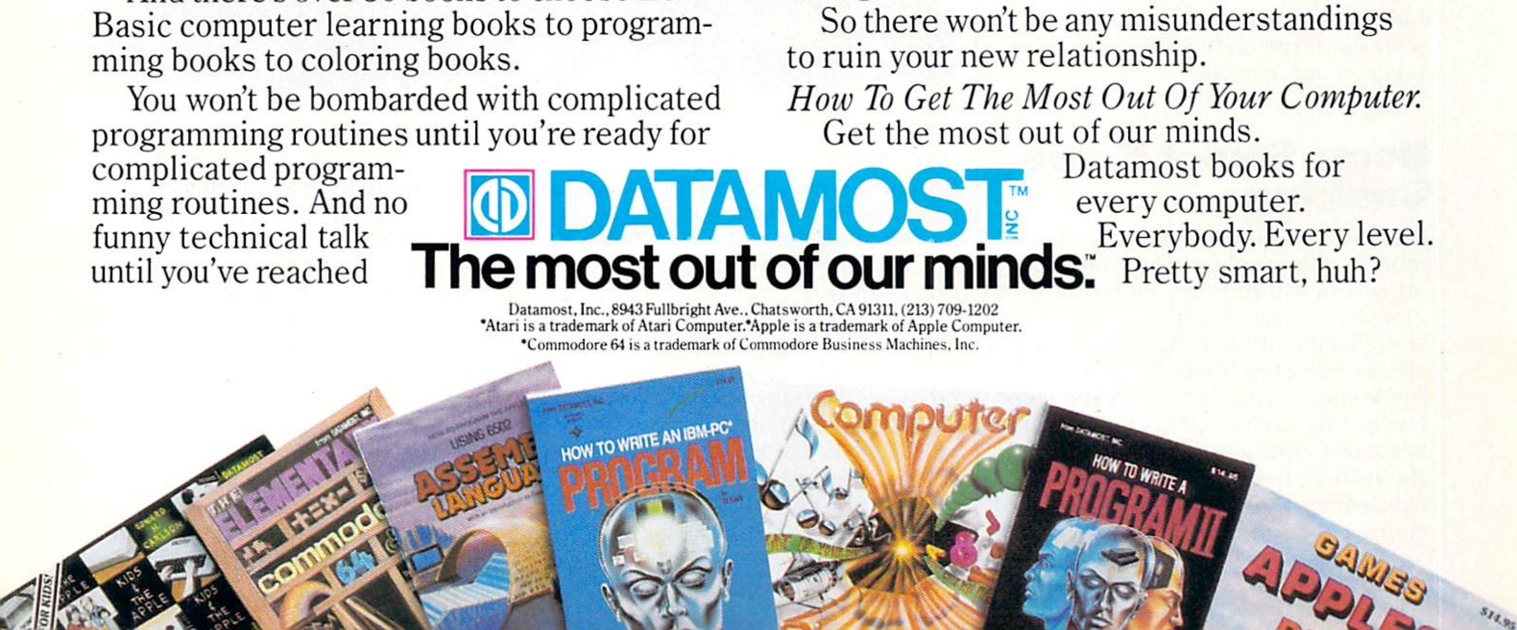
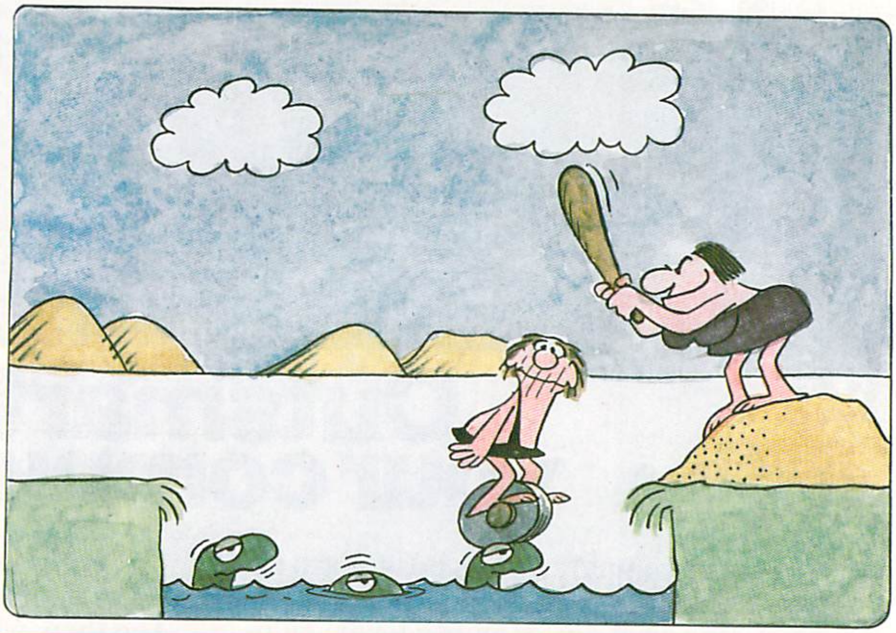


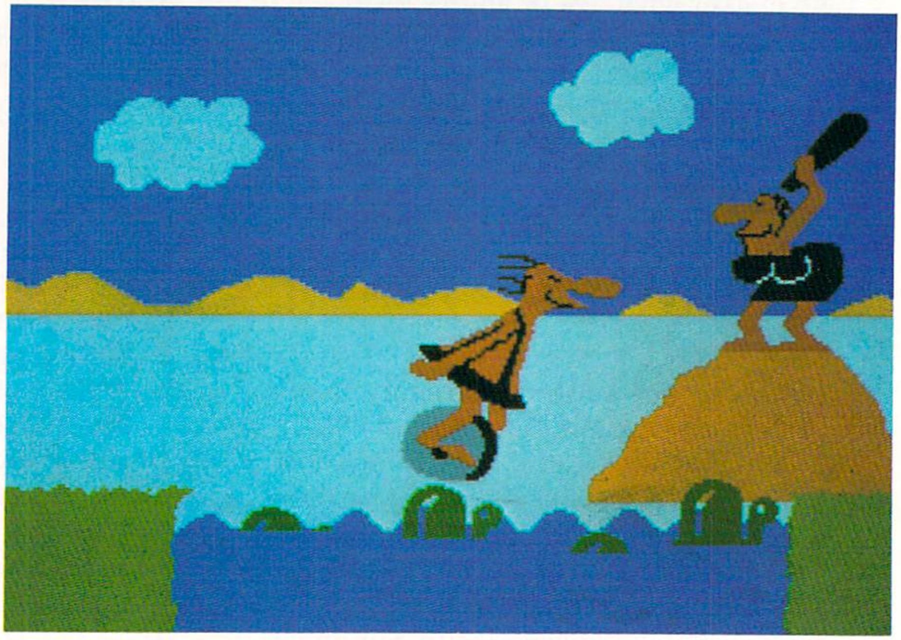
BEHIND THE SCREENS

PEOPLE, NEWS, AND TRENDS

EDITED BY JOHN WALLACE

Comic Computer Conversions





Millions of comic strip fans have laughed at the antics of B.C., the first man of the funny pages. Now the primitive protagonist is set to make his high-tech debut in a rollicking computer game from Sierra On-Line called *Quest for Tires*. Cartoonist Johnny Hart's popular caveman characters will be gracing the screens of up to 80 software products over the next year, if all goes as planned at the California-based software manufacturing company. Cartoonist Hart has maintained a close designing relationship with the games' programmers, so the animation is remarkably vivid.

B.C. isn't the first cartoon character to make the crossover to the computerized medium. Walt Disney Productions has plunged into the software industry with a line of educational software featuring, who else? Mickey Mouse. Early reading and math skills are the focus of the program released last summer, *Mickey in the Great Outdoors*. Also, a new action–arcade game from Datasoft will feature the feisty feline, Heathcliff, in mad pursuit of marauding mice. In addition, the inimitable Pink Panther will be gracing the screens of a game by N.A.P. Consumer Electronics, scheduled for release later this month.

B.C., Mickey Mouse, the Pink Panther, even Marvel super-heroes like Wonder Woman, and (it's rumored) Warner Brothers' sassy Road Runner—all timeless friends from Saturday morning TV and the Sunday funnies. It's good to know they'll be with us in the coming generation of home computer use.

Home Sweet Home Banking

With automatic bank tellers as common as pay telephones in many cities across the country, more and more banks are beginning to take a serious look at pushing bank accessibility one step further, right into the home. Paying bills from the comfort of their living rooms has already become a reality for participants in the initial phases of home-banking development in 30 cities across the country, including Washington, D.C., New York, San Francisco, Seattle, and Detroit. For them, plugging into a bank account will be just a matter of a personal computer, a modem, and special telecommunications software.

Some home bankers will be using traditional brands such as Apple, Atari, and Commodore. Others will be using specially manufactured videotext terminals, one-way terminals that do not have the same versatility or multiple use as the commercial brands. A special personal ID number, and a hopefully raider-proof password will be issued to the user who will no longer have to brave long lines in order to conduct bank transactions.

The banking industry has responded with mixed, but basically favorable, reactions to the idea of home banking. Bigger city banks with more capital to invest in futuristic schemes or trends that may wind up as mere fads are pursuing it steadily. New York City's Chemical Bank, for one, has provided computerized home banking since August. They've leased their system, named

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While price wars and confusion reign all around us, Spectravideo goes about its business, setting standards by which all other personal computers will soon be judged. MSX and LOGO are the two latest examples of how Spectravideo is rocking–and reshaping –the personal computer industry.

MSX AND LOGO.

It is now history that, on June 15 1983, Spectravideo, Inc. joined with most of Japan's largest electronics firms to launch MSX: The most far-reaching personal computer standard in history. MSX is the name given to a specific hardware/software configuration that makes product interchangeability possible. While Spectravideo is proud to participate in MSX, we are even prouder of this fact: It was our own SV-318 computer that was used as a prototype for the MSX design! There are two important aspects to this.

First, all future MSX hardware–i.e. computers, peripherals, appliances–will be based on several key design elements of the SV-318. What does this mean to you, the consumer? A great deal, because when you buy an SV-318, you will not only be able to use all of Spectravideo's own software and hardware–you'll also be able to take advantage of all the remarkable new equipment that will be coming from other MSX participants.

In addition, the software aspect of MSX was largely inspired by the software built into the SV-318. From the outset, Spectravideo offered built-in Microsoft BASIC as its resident interpreter. Now, Microsoft also makes a LOGO program compatible with the SV-318. It was Spectravideo's Microsoft BASIC/LOGO that helped to make MSX possible.

Another standard that Spectravideo can take credit for is the built-in Joystick/Cursor Control. Built right into the SV console, this control is always at fingertips and is much easier and faster to use than external joysticks or conventional editing controls. Certain engineering elements that helped to make this built-in control possible have also been incorporated into MSX.

OTHER STANDARDS OF EXCELLENCE.

While these are the computer standardizations that Spectravideo helped to initiate, they by no means represent the whole SV-318 story. This remarkable computer has also established many standards of excellence that other personal computers now aspire to:

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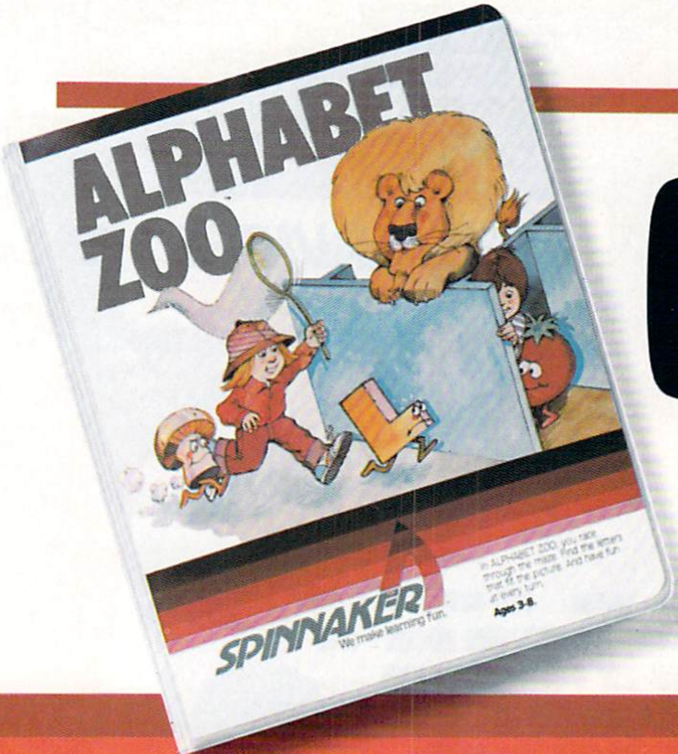
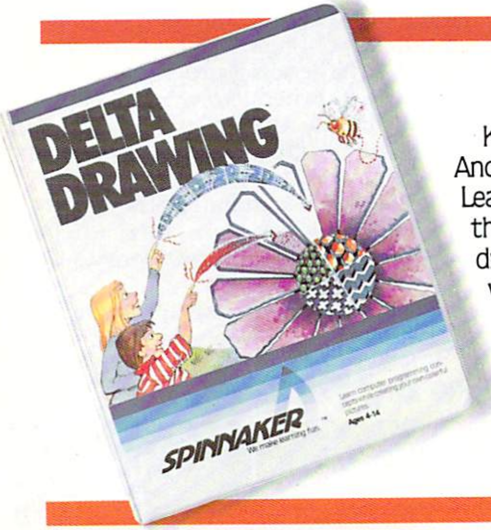
So if you're looking for computer programs that do more than just "babysit" for your kids, read on. You'll find that our Early Learning Programs are not only compatible with **Apple,® Atari,® IBM®** and **Commodore 64™** computers, but also with kids who like to have fun.



A trip through Alphabet Zoo.™ Ages 3 to 8.

It's a race. It's a chase. It's Alphabet Zoo, the exciting game that will have your kids zipping through the maze, after letters that fit the picture on the screen.

And at the same time, your kids will be learning the relationship of letters and sounds, and sharpening their spelling skills. So they'll be laughing and learning at every turn.



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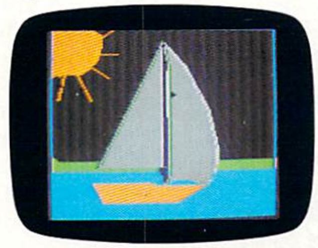

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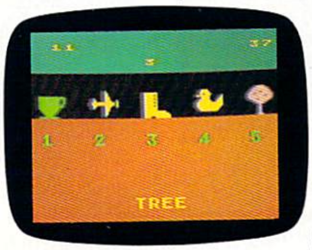
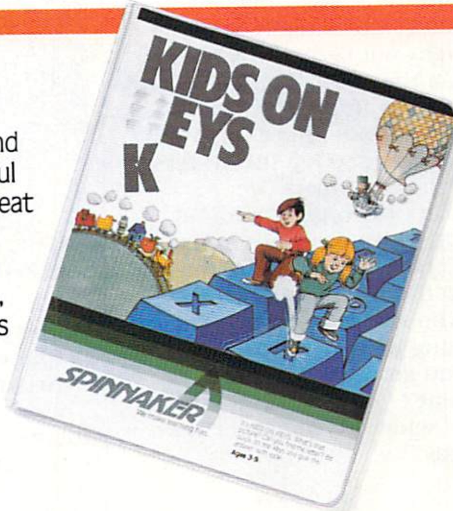


KIDS ON KEYS is a great way to introduce kids to the computer keyboard. Because it offers children three terrific games that teach them the location of the letters and numbers while they have fun with the computer.

The games are fast and fun, with exciting sound effects and colorful graphics. It's a great way for kids to enjoy learning to identify numbers, letters, and words and associating them with images on the screen. And KIDS ON KEYS certainly do have fun!



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Disks for: Apple, Atari, IBM, Commodore 64.
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BEHIND THE SCREENS

Pronto, to at least 17 other banks around the country.

Smaller banks, however, with smaller resources, are more conservative. Many of these banks from Canada, as well as the U.S., have coalesced to research and develop the latest in home-banking technology. Institutions such as BankOhio, National Bank of Columbus, Ohio; First Wisconsin National Bank of Milwaukee; and Marine Midland Bank in Buffalo, New York; have joined forces in a consortium called the Home Banking Interchange. According to Jon Fraser, vice president of First Wisconsin, "With profit margins under pressure, bankers are properly hesitant about making major commitments in costly systems which might not turn a profit for a decade. On the other hand, if home banking proves to be truly important, banks cannot afford to sit idly by while others develop the systems and gain the customers."

Fraser says his organization is proceeding cautiously. "We're not in any race," he explains. "We're trying to develop the right system and figure out who the audience will be. Is it something just for the affluent? How do you get banking into everybody's home? We're trying to understand just what the computer user really needs."

Checking Out the New Technology

As guardians of their community's computer literacy, more than 150 libraries across the country have instituted computer-lending programs. Local residents can check out computer programming by checking out personal computers. Some libraries have installed systems for in-house use; others have launched computer-lending programs. One particularly successful project belongs to the town of Downers Grove, Illinois, where residents have been checking out Timex keyboards since last December.

"It was clear to us that computer literacy would be very important for everyone, not just scientists," says Leonard Goodman, who was president of the Friends of the Library organization sponsoring the project.

"Our principle concern is to give adults the opportunity to experiment with computers in a nonthreatening atmosphere, in the privacy of their own homes, in front of their own TV sets," explains Assistant Librarian Gordon Welles, who helped get it all off the ground. And the ultra-portable Timex proved to be the machine best suited to the task.

The project has been such a smash that the library plans to add four more machines to its original collection of six.

Downers Grove already has a lot of computer-literate kids because of its schools' curriculum. But, as Goodman observed, knowing something about programming and the computer is not just for children. Like computer-lending programs everywhere, Downers Grove's will enable "a wide spectrum of the town to find out what's going on in schools and businesses."

After all, Goodman notes, with computer know-how, "there are jobs to be had if you do, and jobs to be lost if you don't."

Thanks to the town library, a lot more people in Downers Grove do.

Judging the Software By Its Cover

It takes a big fish to make a splash in the vast sea of the software marketplace. A company called Electronic Arts may be doing just that. They're making waves with a striking new packaging concept—software games displayed and sold in album-type jackets. Record store chains like Crazy Eddie's on the East Coast and Record Factory on the West have been distributing software in computer centers for more than a year now. But California-based Electronic Arts is the first company to really follow through with the marketing concept.

Designed to look like mini-record albums, each Electronic Arts package has a striking visual appeal. On each "album" the name of the company takes a back seat to the programmer, also known as the "electronic artist," behind each game. As an "electronic artist," each designer is accorded the same publicity and prominence as a rock 'n' roll star.

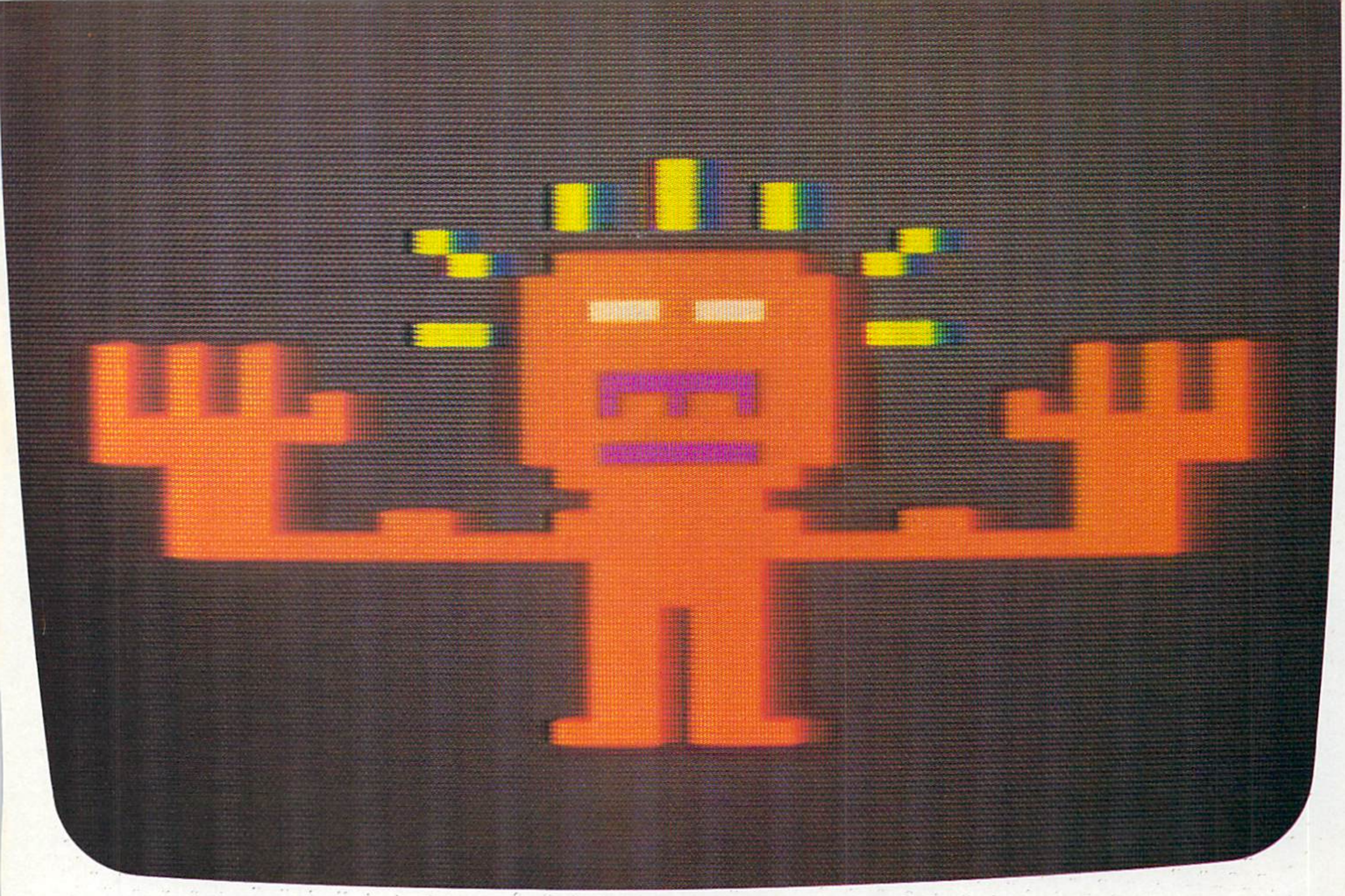
"One of the most important concepts behind this type of packaging," explains Electronic Arts' 18-year-old marketing specialist, David Gardner, "is that people will become interested in the power of the programmer. They'll start looking for people like Bill Budge (designer of *Pinball Construction Set*) just like they look for Police records.

"We're trying to develop a special relationship, I won't say love affair, but a sort of hero-type effect with our software programmers," Gardner says. According to Electronic Arts' vice president in charge of marketing, Rich Melmon, "Certain types of computer software are heavily bought by teenage boys. They're also the ones who spend money on record albums."

So far, the games are selling well. Last summer, after having been on the market no more than three months, their games *Axis Assassin*, *Hard Hat Mack*, and *Pinball Construction Set* were among the top sellers in *Softalk* magazine. *Archon* was in *Software Merchandising*'s Top 20 bestseller list. One Chicago retailer explains that, "In this business, a lot of software comes in plastic bags. It can be great stuff and lousy packaging and it won't sell." Electronic Arts, she says, has an innovative design and solid games to match.

In the realm of computer software, the dictum "Don't judge a book by its cover" is generally good advice. Electronic Arts, however, is helping prove otherwise.

If you've got a good bite-sized piece of computer-related news involving people, trends, or innovations, let's hear it. We will pay $25 for each item we publish. Write to Behind the Screens, c/o FAMILY COMPUTING, *730 Broadway, New York, NY 10003.*



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Chalk Board's revolutionary PowerPad eliminates fear of keyboards and opens up a new world of fun and adventure with computer systems. PowerPad's 12″x12″ touch-sensitive, multiple contact point surface literally puts users *in touch* with their computers. Without the limitations of confusing keyboards and commands, users can now draw on the PowerPad and see their ideas appear on the screen.

The touch-sensitive PowerPad surface is a drawing pad, a multi-colored canvas, a piano keyboard, a jigsaw puzzle, a gameboard. It stimulates and reinforces creativity for users of any age. Chalk Board has turned the computer game into a learning experience.

HOME-SCHOOL CONNECTION

VOLUNTEERS: A KEY TO COMPUTER SUCCESS

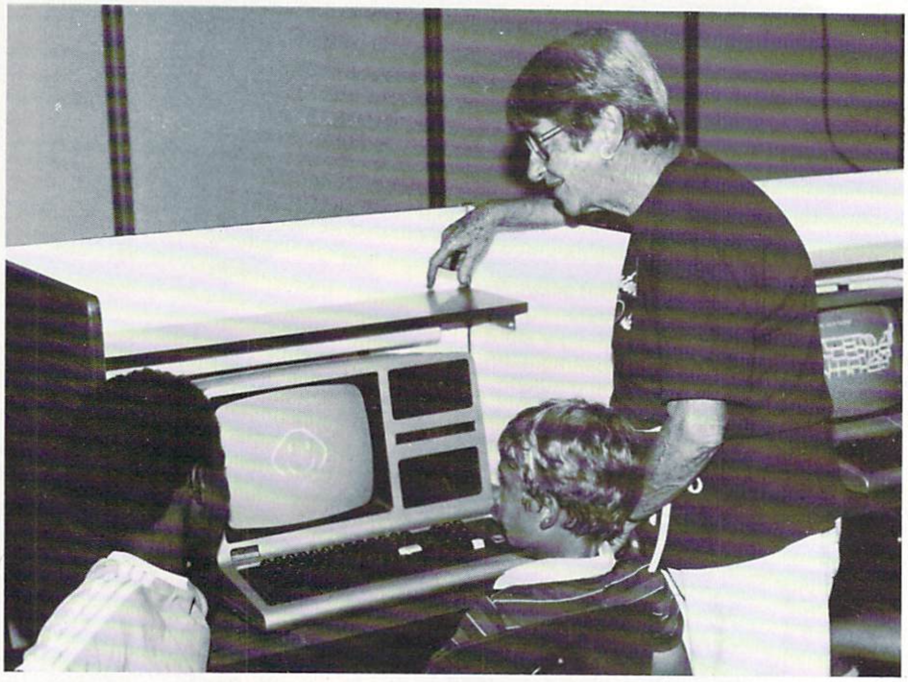
Seventy-one-year-old Hope Kimmell learned about computers to keep up with the kids. Now she teaches *their* parents and teachers.

BY SUSANNE E. TARANTO

The parents of Florida's Key Largo Elementary School worry less about their children and computers than most parents do. They've got Hope—a unique and exciting 71-year-old volunteer "expert." Hope Kimmell lives with her daughter and four-year-old grandson not far from the school. She may be past retirement age, but she certainly has not retired.

Hope's face is not a new sight around school—she's been the School Volunteer Program Coordinator for 10 years. She's a real pro now at recruiting volunteers, knowing how to use them and how to train them. Computers, though, are new to Hope.

When asked why and how she became interested in computers, Hope's face lights up. "The kids are really turned on to computers. I wanted to see what they would do for me. So I took a computer-literacy class at night through the community school program. After one course I became more curious. It's like seeing a new model of a car. You want to test drive it and see how it really works. So I took a BASIC programming class and then a more advanced class." Now she's considered Key Largo's resident volunteer computer instructor.



SPREADING THE WORD

Hope has been instrumental in recruiting both retirees and parents to take the computer courses. She has also encouraged more than half the teachers in the school to take the classes. After the parents and retirees complete their computer courses, Hope charms them into volunteering at the school and becoming computer tutors.

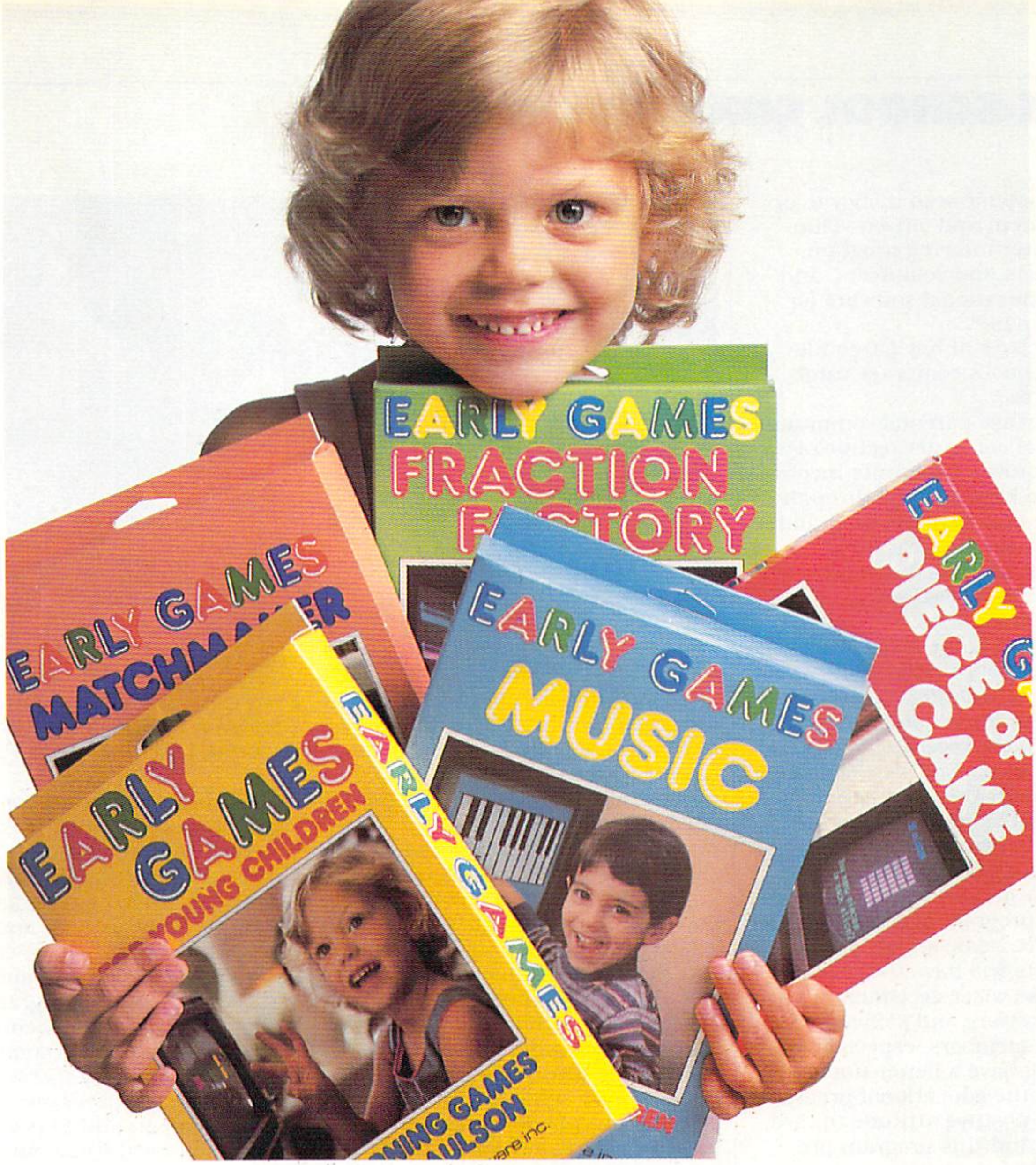
She claims that it's easy. "Most people have never seen a computer in action" she says. "They know only how to spell the word. Getting parents and retirees into the school and offering them a chance to learn to use the computer is a personal thing for these people. It lets them learn about computers and how they can be used at home, and most of all it lets them catch up with the kids. It reminds me of when we had 'new math.' Everyone is curious, but few really know anything about it. This is their opportunity to learn."

HOW IT ALL BEGAN

"We get calls every day from concerned parents who want to know what else can be done for their child or how they can help," explains Dale Wolgast, Key Largo's community school coordinator. "A lot of parents used to ask me if we had computers for their children to use and if there was any way they, the parents, could learn to use computers. They wanted their kids to use them, sure. But even more, they were curious about how these computers were being used with their kids. Once they came into the school and saw first-hand what we were doing, they couldn't stay away. We love to have our parents—and anyone who will volunteer—come in and be part of our school program."

Hope beams as she tells how it all began. She, Dale, and a few other parents and local residents got together and developed a plan for using people who were trained to work with computers as "computer tutors" with students. They applied for and received a small grant from the Florida Department of Education's Educational Improvement Project. (This program encourages public school principals to apply for state-legislated funds of up to $5,000 for a year.) Key Largo's computer tutor

SUSANNE E. TARANTO *is Statewide Coordinator of School Volunteer Programs for the Florida Department of Education, and author of two books on school volunteers.*



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grant will provide seed money to organize a parent and citizen volunteer computer-tutoring program, train teachers and volunteers, and purchase educational software for the tutors to use.

The objectives of Key Largo Elementary School's computer tutor program are:

1) To increase parental/community awareness of computer technology;

2) To improve community involvement in the kindergarten through sixth-grade instructional programs;

3) To improve the academic achievement of these students through the increased use of computers and volunteers.

Those at Key Largo Elementary School agreed with Hope about the importance of training volunteers to assist with computer instruction. The children are receiving computer instruction as part of their schooling. To support this instruction and make it effective, parents and other community members need equal opportunities to gain knowledge of computers and become computer literate. This program also promotes a more positive home-school relationship. Parents will have the knowledge to make wiser decisions in purchasing hardware and software. The community members, especially the parents, will have a better understanding of the educational program and a more positive attitude toward the school. And this program provides volunteer assistance to teachers for computer operation, instruction, and programming.

THE DIFFERENCE

"There is such a difference now," one teacher said. "The parents are so excited about being actively involved with their child's education. The children are thrilled because they actually get to use the computers each day. What's exciting to me is that I have all this extra help each day. Also, the kids are having so much fun working at the computers, they don't realize they're working."

The Computer Tutor Program has allowed more students to work with and learn about computers. It has had a tremendous effect on increasing parental and community interest in and support for computer education.

This success can easily be duplicated across the country. With someone like Hope Kimmel to coordinate the program, a parent/teacher organization such as the PTA or PTO, or any group of parents, can start their own computer tutor program. Several pointers should, however, be taken very seriously.,

Above all, dream big but begin small. It's better to have a few computers and computer tutors in a school, and to have a successful program, than to have a chaotic program that doesn't work.

Make sure to have the program organized and coordinated by someone who is either a school staff member or who has the time to devote to recruiting, training, retaining, and recognizing those who participate. In order for a school volunteer program of any type to work, someone must be willing to coordinate it. It takes someone like Hope Kimmell who has the time and commitment to be a friend and a support to the volunteers and the school staff.

One extremely important factor to remember is that the principal is *the* key to success for a computer volunteer program as well as for any school program. You must get his or her support before you begin your program.

IMPLEMENTING A COMPUTER TUTOR PROGRAM

Here's a suggested step-by-step procedure for implementing your computer tutor program. It can be easily adapted to any program.

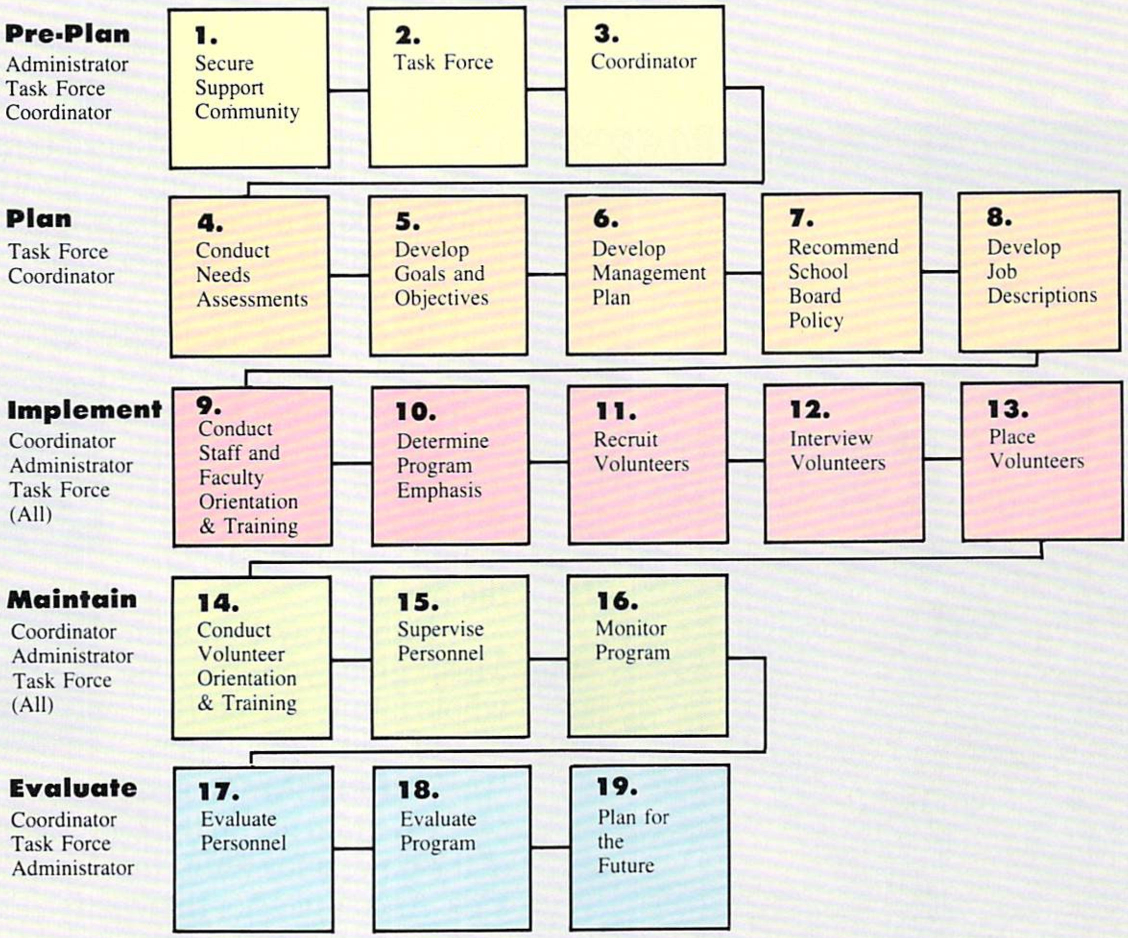
Pre-Planning Stage: After you have gathered together some interested people and have a specific computer tutoring program in mind, try to convince the principal that this is a program that will be important and *will work*. Emphasize that you don't plan to implement it immediately, but only want to know if you can design a computer tutor program and be present when it is approved and has support.

Planning Stage: During this stage the interested people (task force) and the principal should: 1) note the school's needs in terms of starting a computer tutoring program; 2) develop goals, objectives, and an action plan for the program; 3) develop a plan for management—such as who will coordinate the program and what they will do; 4) secure the principal's support and recommend school board policy if this is required for new programs in your school system; and 5) develop job descriptions for the computer tutors. Job descriptions will be used to define what the computer tutors will do, how they will be trained, when they will work with the children, etc.

Implementation: The first step, after you have the support of the school principal and know what you want to accomplish with the computer tutor program, is to have an orientation session with the school's teachers to tell them how this will help them. The second step will be recruiting the tutors and providing courses to train them to become computer literate and to serve effectively as volunteers. Volunteer tutors should remember that the teacher is the boss in the classroom, and the tutor the teacher's employee.

Maintaining the Program: This stage could also be called the *retaining* stage, for it involves how the tutors, teachers, and students are treated and react. It involves supervising the tutors; providing time to discuss the program with the tutors,

SCHOOL VOLUNTEER PROGRAM FUNCTIONS FLOWCHART



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teachers, and students; and making any necessary changes in the placement of tutors, hours they work, and need for additional training.

A big part of this stage of the program is *recognition.* As Hope Kimmell states, "You have to thank everyone all the time. This is really a PR, or public relations, job. Tutors have to be convinced that they're appreciated; don't thank them only at an end-of-the-year activity such as a volunteer appreciation luncheon, but praise them in some little way each time they come in. The students need to be reminded to thank their tutors. Teachers need to be told that they're wonderful for using a tutor. Students need to be thanked for being courteous and for the achievements they have made through computer tutors. Showing appreciation can determine volunteers will stay on and be effective.

Evaluating the Program: This part of the program is not always the fun part and therefore is often left undone. However, evaluating the personnel who have worked with the program as well as the program itself is very important. Questions should be asked and the answers sought: Were the tutors effective with students? Did the children increase their learning by using computers? How did the teachers, parents, and tutors like the program? What changes would they like to see made next year? Were there enough computers in the school?

If the answers indicate that your goals and objectives for the program have not completely been met, then new directions for meeting them should be made. Perhaps more computers need to be purchased, but the school doesn't have the necessary funds. Then the task force can look for other ways such as fund-raising drives, clubs to sponsor fund-raising, or other innovative ways to get the computers into the school.

The use of computers in schools is growing at a phenomenal rate, which is not surprising to most of us. Don't be left in the "horse-and-buggy" age. Join the era of technology and get involved in starting a computer tutor program at your child's school. You and the other members of your community will become computer literate. Your children will be better prepared for today's world, as well as for tomorrow's. Your community will support quality education for your children by being actively involved in an exciting new program. And you, as well as your children, will be turned on to the wonderful world of computers.

You may not have a computer in your home, but, as Hope says, "Just because you didn't invent the automobile doesn't mean that you won't drive one." Learning about computers through a computer tutor program at your child's school may open up a new era for you too. FC

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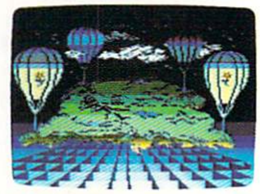
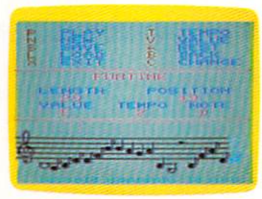
The second mode lets you play your song in a fun-filled action game. You control a drum major trying to touch the notes before a small but pesky poodle catches up to him and slows down the parade.





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These two are the first of an extensive series of Learning Fun games we have planned. Look for these, as well as other EPYX titles, wherever computer software is sold.

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GAMES

WAR GAMES: Fact, Fancy, and Lots of Fun

BY JAMES DELSON

What do H.G. Wells, Winston Churchill, Louis XIV, Malcolm Forbes, my friend, John Monteith, and I have in common? War games.

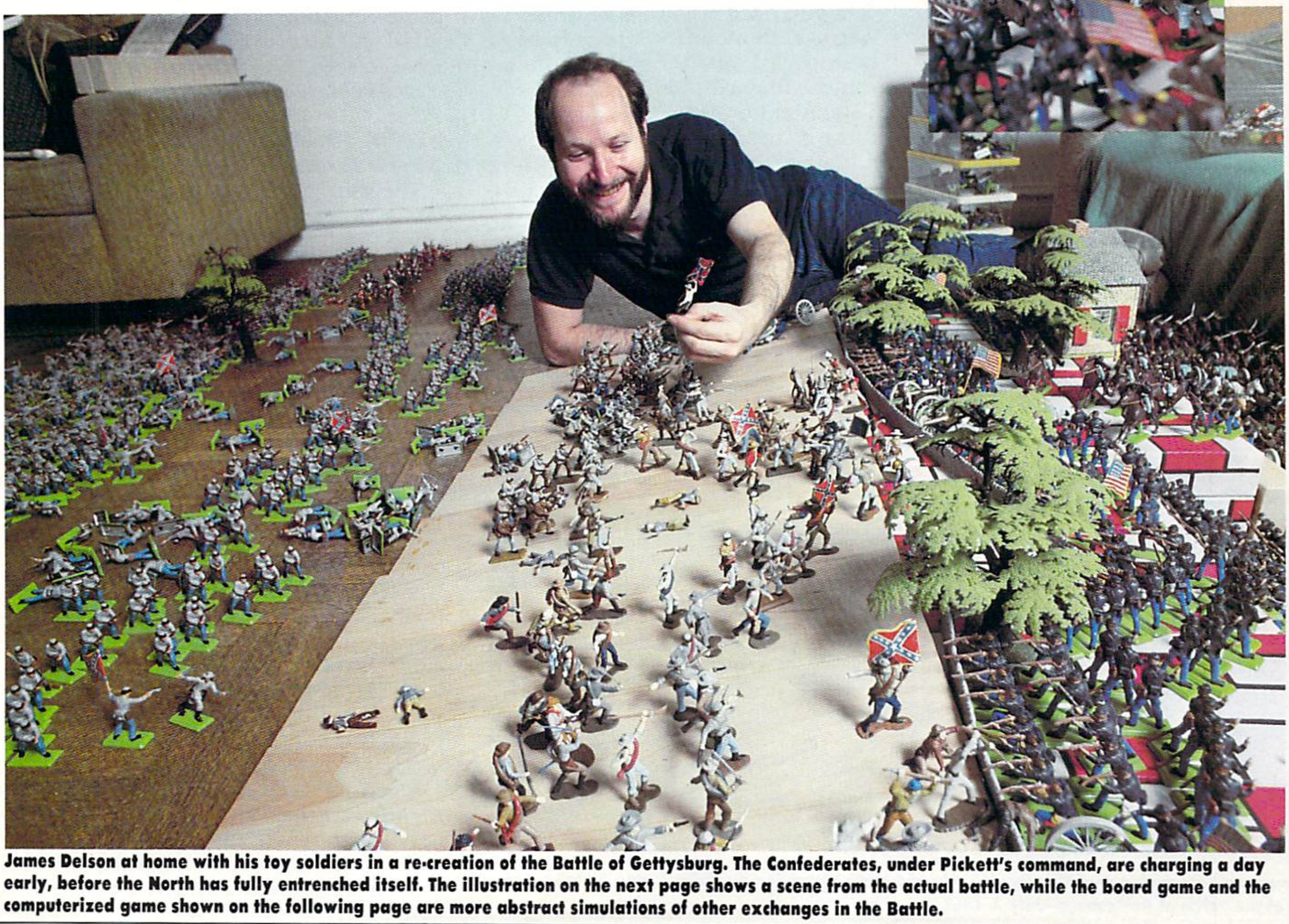
The computerized versions that I'll be reviewing frequently and that are available at your neighborhood computer store are only the most recent arrivals in a family of gaming that goes far back in history. Their ancestors include such well-known favorites as chess, Go, and Risk.

JAMES DELSON *is* FAMILY COMPUTING*'s games critic. When he's not constructing elaborate scenarios with his miniature soldiers, playing* Wizardry, *or designing new role-playing games of his own, Delson writes movie screenplays. [Next month, Delson will take a look at computer games and the spirit of Christmas.]*

For the past 24 centuries, war games have been conducted with players using toy soldiers or tokens made of wood, metal, or any of a variety of materials. In fact, in one form or another, they've been around for as long as soldiers and their leaders have tried to plan their military actions before committing themselves to battle. Don't be confused by the name of the genre; *war games* actually means tactical planning, simulation of real-life military combat. It's only comparatively recently that one could begin to think of a family sitting down and playing war games, especially on their home computer. Before the 19th century, war gaming was strictly the business of warriors and princes.

THE CAVEMAN DRAWS A DIAGRAM

When a caveman drew a diagram in the dirt showing fellow tribesmen how to encircle an opposing tribe, that was a primitive kind of war game. The first recorded war game actually prevented a battle. It was



James Delson at home with his toy soldiers in a re-creation of the Battle of Gettysburg. The Confederates, under Pickett's command, are charging a day early, before the North has fully entrenched itself. The illustration on the next page shows a scene from the actual battle, while the board game and the computerized game shown on the following page are more abstract simulations of other exchanges in the Battle.

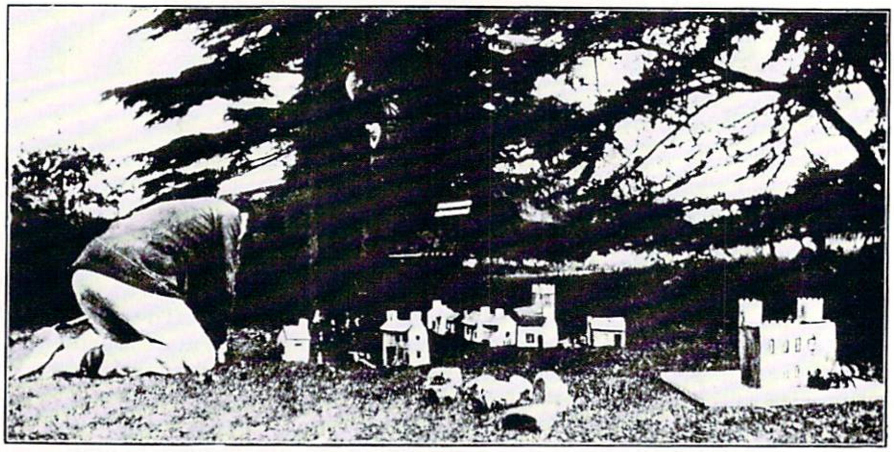
GAMES

conducted in China, some 2,400 years ago. Two rival princes saw the absurdity of combat because an elder statesman had the good sense to demonstrate to them precisely what the outcome would be. The game eliminated the need to fight, and the besieging prince went home.

Young princes the world over played with toy soldiers as a way of learning about armies and military combat. Their superiors were entertained by more advanced games such as *Wei-Hai* (Chinese for encirclement), which is known today as Go, and Complete Chess, an exotic game involving a strange menagerie of playing pieces, such as giraffes, camels, and grand wazirs.

In the mid-17th century, a variation of chess, the King's Game, came into use as an actual training tool for officers learning military tactics. A complex game called *Neues Kriegspiel* (New War Game) was developed in the early 1800s portraying 3,600 squares of terrain on the border between France and Belgium. A great-grandfather of the war games we know today, it hooked the King of Prussia, who sometimes stayed up all night to play out elaborate scenarios with his sons and friends. He could very well be considered the first war games addict. A military order was even issued, requiring every regiment to get a hold of the game for training purposes. Other countries followed suit and before long Russia, England, France, and the U.S. were all using games to learn how to win in actual battle.

Of the armies who used war games in World War II, none relied more heavily on, or suffered more severely in spite of, them than the Japanese. They played to plan and predict the success of their Pearl Harbor invasion. And they lost dramatically in the battle of Midway, by cheating in a war game simulation they had played out earlier.



H.G. Wells playing out his very own war game, Little Wars, on his lawn. The instruction manual for his game was the first war gaming guide book for amateurs.

With the advent of the earliest computers in the late 1940s, war gaming took on a whole new shape. Computerized scenarios of wars waged with atomic weapons have been played out ever since. With acronyms like STAGE (Simulation of Total Atomic Global Exchange), these games are ultra-sophisticated, not altogether unlike the game intercepted by the young hacker in the movie *WarGames*.

War games moved into the family room about 150 years ago. The extraordinary writer H.G. Wells, whose specialty was fanciful futuristic novels, put together a book called *Little Wars*, the first amateur war game rule book.

From the toy soldier and the rooks and kings of the chess set, war games evolved into popular games like Risk, Diplomacy, and Stratego. One company emerged ahead of the pack: Avalon Hill was created by Charles Roberts, who designed the first American board war game. Its games, including Gettysburg, Stalingrad, and Afrika Corps, re-created real-life scenarios that had been waged in earlier times.

A newspaper engraving depicting the Confederate Army assaulting the Union forces in the second day of the Battle of Gettysburg—July 2, 1863.

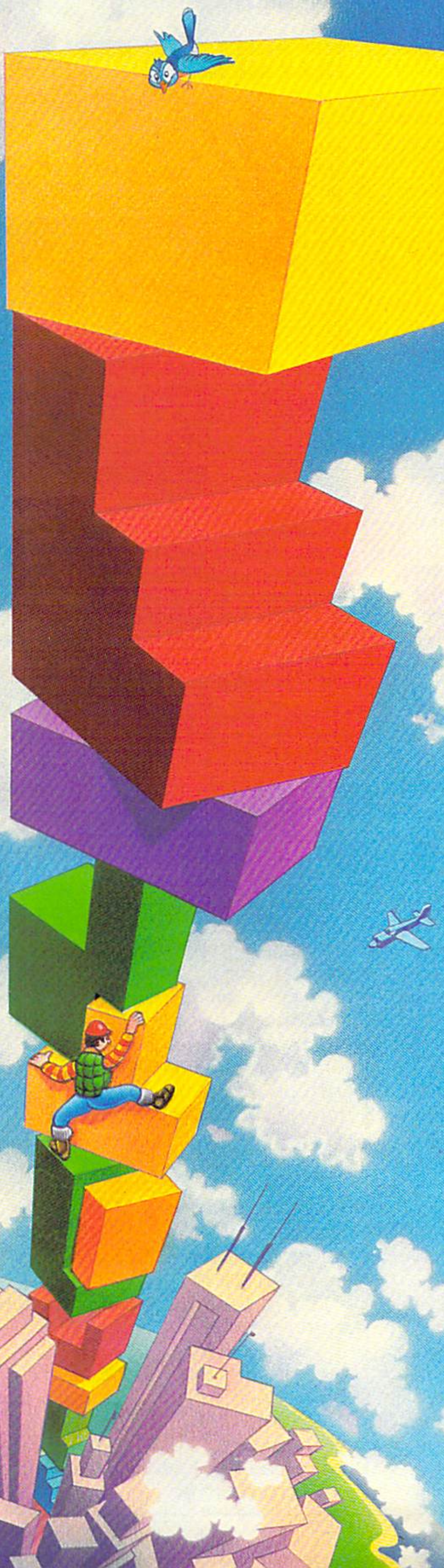
MORE THAN JUST SPACE SHOOT-'EM-UPS

The war games that you and your family or friends might play on your computer at home are more than just space shoot-'em-ups; they're not skill arcade games in which you've got to blow up tanks before they blow you up; and they're not like the text adventure games featuring battling sorcerers in a quest for magic treasures.

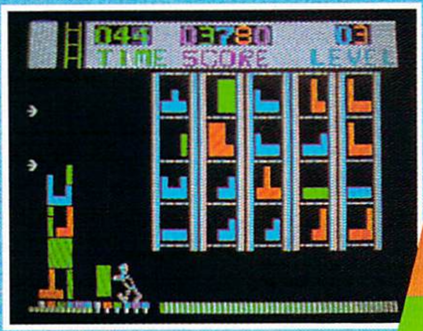
Chris Crawford's *Eastern Front (1941)*, distributed by the Atari Program Exchange, is believed to be the first commercial war game for the computer. It's a simulation of the German invasion of Russia in World War II, in which the solo player tries to change the course of history by defeating Russia's counteroffensives controlled by the computer. Because of the strategy involved, and the element of historical re-creation, it really can't be considered anything else but a war game.

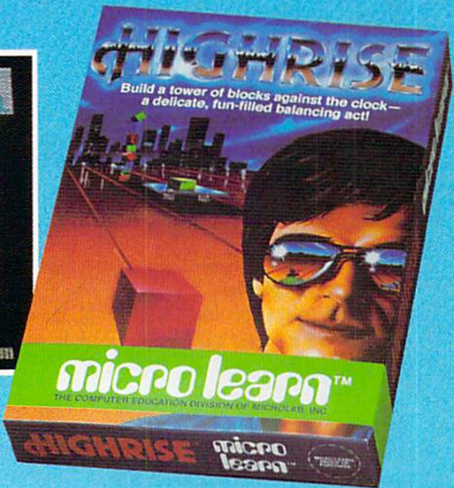
Electronic Arts' popular new game, *Archon*, on the other hand, isn't so easy to pin down. (See my review, p. 146.) Although many may think of it as little more than a challenging

Introducing a new high in computer skill games



Think balancing a pile of blocks is kid's stuff? Think again. Building a stable tower in this game takes muscle, a keen eye and a good bit of planning. Barnaby, Highrise's master builder, supplies the muscle. But it's up to you to select blocks of various shapes and sizes from any of five chutes. Then load 'em onto the springboard in any of five positions and flip 'em up onto the pile. Plan your block selection and placement correctly and you build a balanced pile. Stack 'em wrong and your pile comes crashing down. Each block you add racks up more points. Complete a pile and Barnaby climbs up and takes you to the next level of difficulty. But hurry—you're piling blocks in a race against the clock. Highrise. It's a new high in computer skill games. Recommended only for players with a keen eye, an agile mind and very steady nerves.





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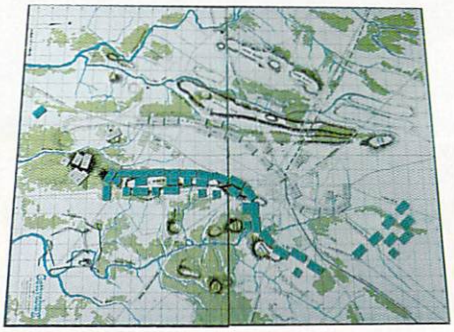
skill/arcade diversion, *Archon* is actually a complex strategic/tactical scenario similar to chess in the number and variety of pieces involved. Tokens perform feats of magic and actively conduct combat using the kinds of skill/arcade moves found in games like *Demon Attack* or *Space Invaders*. But real mastery of this exciting game is achieved by the player who uses the kind of tactical planning and long-range forecasting that make war games such a challenge.

Computerized war games are essentially electronic versions of the complicated strategy games, the tactical exercises that have been played for centuries. They could revolutionize the genre—because of the potential capacity of the computer and its ability to organize masses of information.

War Games also enable the gamer to play solo—against the computer. This allows players to set the skill level of their opponent: the computer. The novice can gain experience without having to track down an opponent of the same caliber. It's pretty hard to imagine this kind of flexibility with complex games involving legions and legions of toy soldiers or extraordinarily involved board games such as Risk or Diplomacy.



Avalon Hill's board war game, Gettysburg. The players controlling the Confederate army are trying to encircle the Union forces, instead of facing off along a wide front, which is what really happened.

With its experience in developing conventional board war games, Avalon Hill has become one of the leaders in the field. In its computer game *Legionnaire*, combatants reenact ancient Roman military campaigns on a map of the old world. Another, *Paris in Danger*, is a scenario based on Napoleon's Battle of Waterloo.

In the old-style board war games, you move your units, or counters, over a map, engaging opponents in battle, performing other actions while keeping track of your troops' morale, supplies, and combat strength. The computerized versions aid tremendously when it comes to organizing and ordering all these time-consuming "bookkeeping" duties. They also add to the realism of combat encounters by keeping the maneuvers secret until there's an actual confrontation. After all, before the advent of modern technology that brought about such tools as reconnaissance satellites, or radar, troops had no idea where the opponent would show up until he came marching around the bend, or over the crest of a hill.

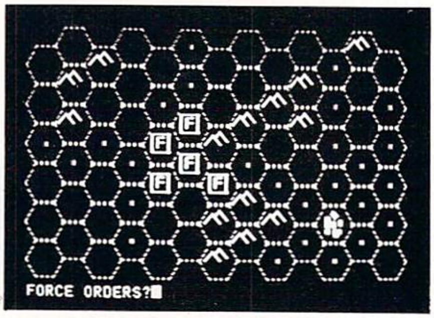
THEY HAVEN'T GOT THE K

In spite of the rich variety of historical scenarios they re-create, today's commercial computerized war games are not particularly sophisticated. And they're not nearly as much fun as their conventional, noncomputerized relatives. First of all, they just haven't got the K. Defense Department mainframes have memory capacities that enable them to simulate accurately a wealth of possibilities. Of course, the current personal computers on the market can't really match the power of two, three, or four family members putting their imaginations to work and playing out those possibilities. Computerized simulations of battles like Gettysburg or the North African Campaign (see my review of Strategic Simulations' *Knights of the Desert*, p. 147), involve only a limited number of "counters" signifying military units.

While computer war games are much tidier affairs than their predecessors, the movement of each unit often becomes a rather painstaking process. Using a pointer or cursor, you must move units one-by-one across the screen, instead of simply picking them up and placing them from one location to another as you would on a floor, lawn, or card table. In addition to this cumbersome movement system, the space or maps provided for combat are often somewhat cramped. Also, many conventional war games enthusiasts might miss the excitement, the feel of moving soldiers or pieces over a living room floor or a green backyard. In spite of these shortcomings, I've found that the computerized war games provide a good introduction to their manual, board-game counterparts. And no doubt, with the improvement of today's personal computers and their expanding memory capacities, computerized war games will better be able to re-create and simulate real campaigns.

WINDOWS ON A WORLD THAT WAS

You might wonder why anyone should be introduced to this kind of game in the first place. Especially in light of the fact that for many, war games aren't just for fun; they're

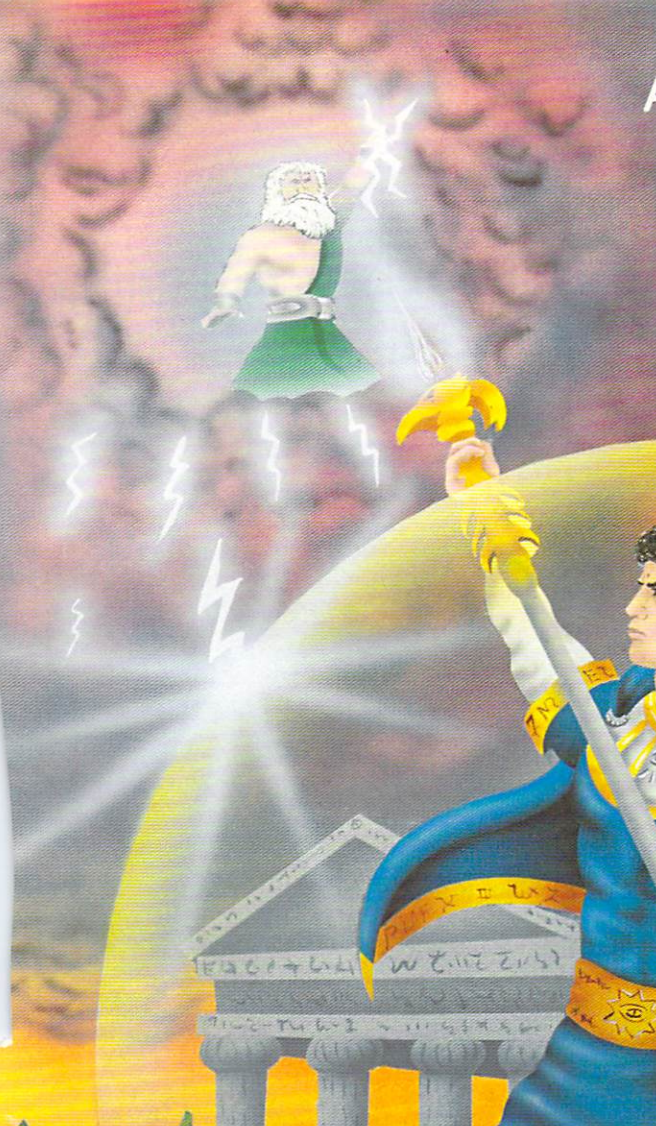


A screen from Strategic Simulations' computerized war game, *The Road to Gettysburg*. Southern General Robert E. Lee is attempting to reach the battlefield and seize the high ground before Union General George Meade arrives. There are only 11 pieces per side in the computerized version of the game, while the board game uses almost 100, and the toy soldier exchange more than 1,000.

simulations of the real thing, which could very well involve the annihilation of hundreds of thousands of lives. Naturally, some people will object to war games and their inherently violent subject matter. Or they will fault specific scenarios, such as that of *Knights of the Desert*, in which you play the role of a Nazi commander.

Understandable objections. But in the real world, war games have prevented, as well as helped plan, battles. And in the strictly fanciful arena of war gaming on the family computer, such activities—the recreation of historical situations, giving you the power to change the course of history—have unlimited potential to encourage you to use your wits and imagination. You have to use all the powers of reasoning and logical deduction you can muster. As for violence, in war games it isn't real. It's imaginary.

Like old paintings, war games are windows to an age that was. Whether you're playing with wooden tokens on a board, toy soldiers on a grassy yard, or counters and a keyboard, you'll have the chance to rewrite history. And what better way to learn about history than by trying to re-create it? FC



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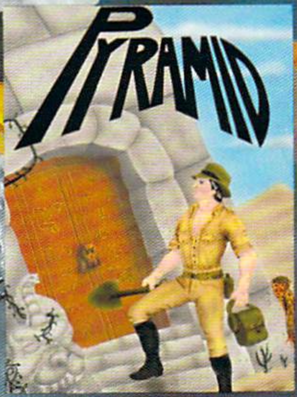

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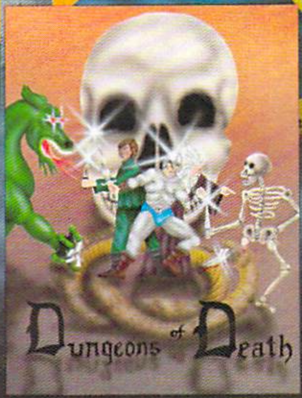

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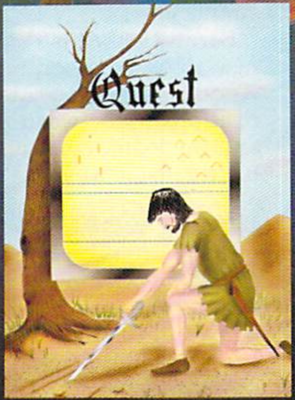

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HOME BUSINESS

COMPUTE, CONTROL, AND CREATE

A weaver combines the traditional skills of her craft with a computer and reaps more than one reward.

BY JON ZONDERMAN

Wandering through the stalls at the New Hampshire Crafts Fair, visitors marvel at the intricately carved wooden furniture and the colorful glazed pots and dishes. They stop and wonder at the ingenuity of the craftspeople and their ability to devise objects for their homes that are practical as well as beautiful.

Suddenly, colorful blinking lights catch the eye. A visitor turns to find himself confronted with . . . a computer? Nestled between two stalls of demonstrations in wood carving, Sarah Haskell sits at an Atari 400, pushing keys that, in seconds, change the brightly colored patterns on her monitor. Next to her stands a loom rigged with threads of all colors.

What is this sophisticated machine full of microchips doing at a crafts festival? And what possible connection could it have with a simple loom?

Sarah Haskell is demonstrating a new software program called *Weave Master.* To understand the relationship between the computer and the loom, one must first examine the basic weaving process.

HOW IT WORKS

There are two variables to be manipulated on a loom: warp threads, which run vertically from the weaver to the back of the loom and control which threads will be raised or lowered, and weft threads, which run horizontally. *Weave Master* allows the weaver to manipulate the size, spacing, color, and thickness of these two variables, which are represented by colorful lines on the monitor. Once a satisfactory pattern or design is developed, the weaving can begin.

Before *Weave Master* was developed, Haskell would spend day after day tediously experimenting with abstract patterns on graph paper before even approaching the loom. That process now takes just a few hours. Haskell estimates that using the computer is three times as fast as using graph paper. Not only can she design faster, but with the Atari's three-level magnification ability and split-screen viewing, Haskell can create far more complex patterns than she ever could on graph paper. Plus, at the touch of a key she can magnify any section of her design and see a variety of views of her designs, including a flip-side view.

The program, which runs on Atari 400, 800, and 1200 computers, is sold by Macomber Looms of York, Maine. The company has been redesigning and improving upon the loom and the process of weaving since 1936. *Weave Master* is the second leg of Macomber's Add-A-Cad computer weaving system. (CAD stands for Computer-Aided Design, a concept that inte-

Outside the New Hampshire Crafts Fair, Sarah Haskell demonstrates a new software program.

JON ZONDERMAN *is a contributing editor to* Computer Update, *the magazine of the Boston Computer Society. His work has also appeared in* The New York Times, Science Digest, *and* The Boston Business Journal.

PHOTOGRAPHS BY FLINT BORN

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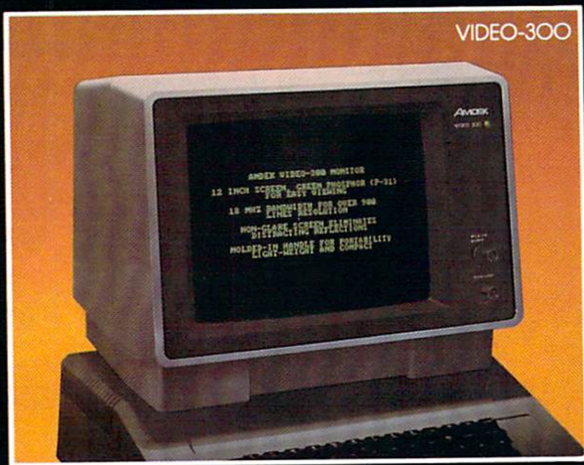

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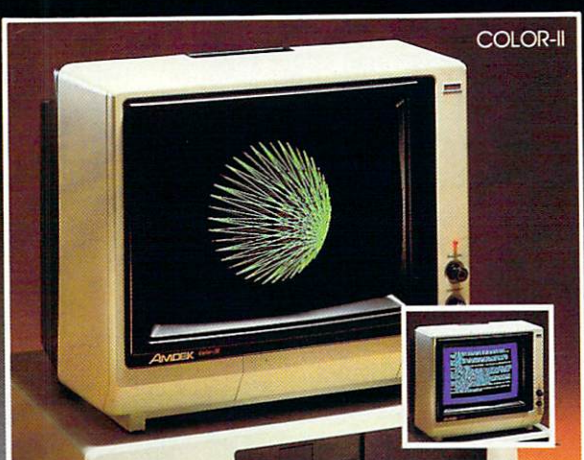

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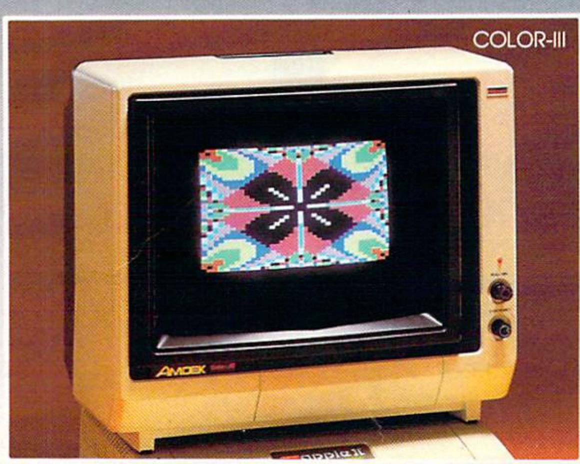

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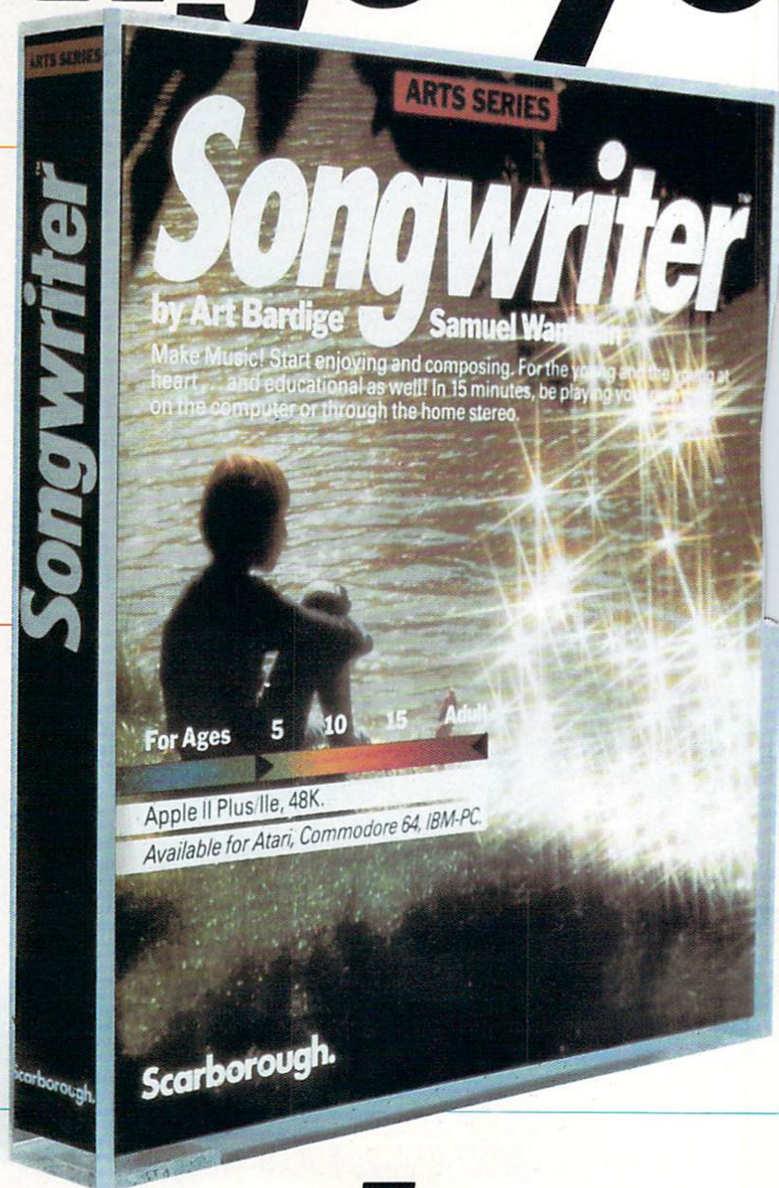

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Like all Scarborough programs, PictureWriter encourages experimentation and continually challenges the child to explore new avenues. And all the while, PictureWriter subtly develops the child's familiarity with the fundamentals of step by step computer programming.

Getting started is simple. The built-in tutorial zips the artist into the program quickly and keeps him or her creatively occupied for hours.

The possibilities are endless with PictureWriter. In fact, children find it so captivating that parents will probably want to doodle with it, too. And why not?

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grates computers and engineering, drafting, technical drawing, and other design tasks.) The program sells for about $180 in cartridge form. Supplements are available in disk form and cost from $40 to $95. One version available on disk, *Weave Master Library*, comes with premade designs that you can use or combine to create new patterns. The first Add-A-Cad product was *Designer's Delight*, a single-function program that helps weavers set up pedal control of the loom. *Weave Master* can be used either in conjunction with *Designer's Delight* or on its own. You can use a monochrome screen, although, for obvious reasons, a color monitor is preferred.

Amateur designers find the program easy to manipulate. Haskell says her husband and sister, neither of whom have experience weaving, were able to run the program and begin to design right away. She wasn't even home to assist them. Users can design anything from place mats to complex patterns used in clothing, upholstery, and wall hangings.

You don't even need to own a loom to use *Weave Master*. Some designers prefer to focus solely on creating patterns and selling them to weavers. Some share looms with other craftspeople.

Beginning designers find they are encouraged to create patterns on a program like *Weave Master* because it eliminates much of the drudgery of the process. Haskell believes it is important for craftspeople to understand how technology and innovation can enhance traditional techniques developed centuries ago, thus relieving them of some of the more tedious and time-consuming practices involved in their craft.

THE TEAM THAT PUT IT TOGETHER

Haskell's interest in new technology led her to Macomber Looms in 1979. She graduated from the Rhode Island School of Design's Textile Program in 1976, and, after a few years of working on her own, she joined Macomber as their weaving consultant, giving them the user's perspective during their three years of work on both *Designer's Delight* and *Weave Master*. She attends conferences and conventions as their representative, demonstrating the program, and teaches weaving classes at Macomber.

In fact, it was Haskell who brought Rick Hart, owner of Macomber Looms, and Michael Broos, the program designer of *Weave Master*, together. Hart had been looking for someone to write a program to accompany *Designer's Delight*, a program that would expand upon the manipulation of the threads as well as the pedal. Haskell knew that Broos, the husband of one of her weaving students, was a software designer and that he lived only a few minutes away from Hart. The two men made a natural team—Hart was eager to market a program that would accompany *Designer's Delight*; Broos knew how to write it. Inspired by the success of *Weave Master*, Hart and Broos are already working on expanding the program, while developing new programs to apply to other crafts such as knitting.

LEARNING A NEW SKILL

Haskell and her husband, Ben, live in Newmarket, New Hampshire, a 20-minute drive across the border to Macomber Looms in Maine. Working first out of a studio in an old mill building in town, she and Ben, the owner of a local office supply store, later moved into a century-old house where she works in the front room.

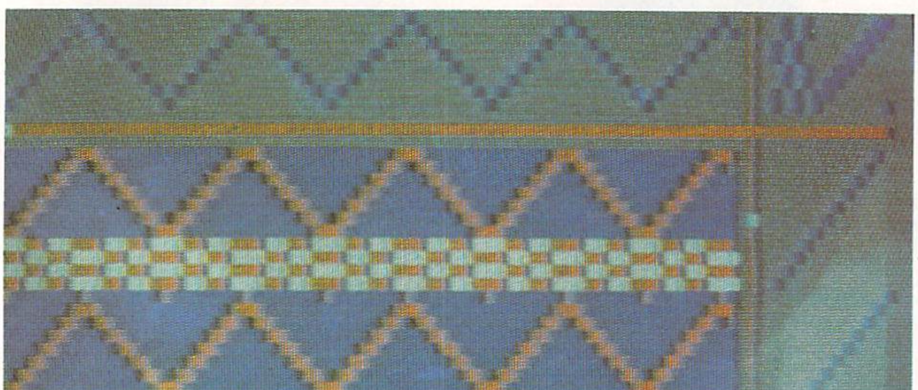
Most of Haskell's weavings are large pictures of seascapes and landscapes that adorn the walls of offices and businesses throughout New Hampshire and northern Massachusetts. These tapestry-like wall hangings, based on water-color paintings she makes, range from 12 to 60 square feet and take six to eight weeks to complete. They are one-of-a-kind and do not lend themselves to computer assistance in the design process. But now that Haskell has been experimenting with abstract-pattern weaving made easier by *Weave Master*, creating more complex and interesting designs, she believes her clients may be attracted to this type of wall hanging in the future.

The computer has not only allowed Haskell more of a creative margin in her work; it has given her several other rewards. The academic challenge and the time she saves are the most beneficial.

"The reason I'm even getting into this is that the stuff I do to make money is challenging, but this is even more challenging," Haskell says. "It's like being back in school, only teaching yourself. Actually, it's like the computer is the teacher."

FROM FRUSTRATION TO FREEDOM

Haskell doesn't think the use of *Weave Master* will boost her income much above the annual $10,000 or so she currently earns from her work. She does believe she will use any productivity gains the computer gives her to spend more time refining and perfecting designs rather than completing more projects. "It doesn't make you better, but it does make you faster.



From graph paper to video screen: Sarah Haskell can now design her patterns using the computer.

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HOME BUSINESS

It allows you to look at so many more variables faster."

Naturally, there are obstacles to overcome in learning a new skill. Because of all the variables, Haskell sees the temptation to try to get beyond the basic goal of weaving—or any art for that matter. "There are so many variables it's really distracting. I find it difficult to hone in on one idea. I constantly have to remind myself to keep it simple, keep it clean."

This is a problem many people have encountered when working with computers. The computer adds so much dimension to the situation that it's hard to keep focused on the goals of the activity.

In learning any new skill, you're bound to get caught up in becoming comfortable with the technical process, or "how to," of the skill. But once the skill has finally been mastered, former frustration leads to a new-found freedom and an even greater creative control in your art or craft. Haskell believes that any level of weaver can benefit from *Weave Master*.

DEMONSTRATING SUCCESS

Hoping to share with fellow craftspeople her enthusiasm and confidence in combining the computer with traditional weaving techniques, Haskell wanted to demonstrate both *Weave Master* and *Designer's Delight* at the League of New Hampshire Craftsmen's annual fair in 1982. Her proposal was turned down by the league. She reapplied and was finally accepted this past August.

For the demonstration, Macomber Looms lent her an Atari 400, but now convinced of the value of the computer in her work, Haskell has decided to purchase her own Atari 800. Like any other artist who continually tries to refine and improve upon the process of developing new and more creative work, she has learned to use the computer as a valuable tool in the weaving process, thereby freeing her from hours of drudgery for time to dream.

A computer in a crafts festival? Absolutely! American ingenuity is as strong as ever and continuing to thrive in the homes of Sarah Haskell and a variety of other artists. The computer is as revolutionary a tool to today's craftspeople as the loom was to our ancestors hundreds of years ago. FC

COMPUTING CONFIDENTIAL

THINGS THAT GO BEEP IN THE NIGHT
Computers Are Invading Our Dreams

BY SARAH KORTUM

As computers become part of our everyday experiences, they're increasingly apt to enter our dreams at night. And in dreams the anxieties we feel, especially those that are unspoken, can become really frightening. It's not unusual for the computer to come to life, as many of the dreams expressed below illustrate.

A woman who still finds it hard to refer to the computer as "it," prefering the pronoun "he," dreamed the keyboard grew beneath her fingers. Then its parts whirled around the room, expressing a force that she suspected lay dormant during the day. Sometimes this sense of "life" turns into a nightmare, as in one man's dream in which his printer became a malevolent force working against him.

Often, the computer turns human in dreams. For those who sit in front of a terminal all day long, it is perfectly natural for the computer to be the friend they talk to at night. And for many of these people, the computer in their dreams is just an extension of themselves.

The experience of working at a computer is not always a frightening one in dreams. It can be a pleasurable, almost hallucinatory, experience. In some people's dreams, the computer seems to glow. And one man recalls a dream from his childhood of a futuristic house that was controlled by a computer. When he was in the "dream" house he was happy. But when he woke up and found himself back in his parents' home with no computer, he felt an acute sense of disappointment.

What follows is a collection of real dreams experienced by various people across the country.

Connie Connors, *24, is a computer instructor in New York City. She compares her dream to work-related nightmares she used to have as a waitress, when she would dream "of not being able to get the food out fast enough! This computer dream was a lot like that." But in this dream, which she had when she first started teaching in January of 1983, her worry is that she will not be able to learn fast enough all she needs to know about computers.*

SARAH KORTUM *is the lifestyles editor of* FAMILY COMPUTING.

"When I first started learning about computers," says Connie, "I felt they were smarter than I was. They had a mind of their own and they were in control. I had a very difficult time referring to the computer as 'it.' I would generally say 'he' or 'she.' Mainly I'd say 'he'—I hate to sound sexist! I'm sure that it's a very deep subconscious sort of choice: that this machine, this technology is definitely coming from a man. And in my dreams these computers were actually personified. They had no sex, but they were animated.

"In this one dream I saw myself from a bird's-eye view sitting very quietly working at the computer. I was surrounded by a lot of equipment, because that's the environment in which I work. The most clear image I can remember is of the keyboard growing. [In real life] the keyboard seems to plague me. Maybe it's because of my self-consciousness about not being able to type. But it was like this computer suddenly was coming alive. I was not so wrong—this thing really *was* real!

"The keys just kept coming out [of the keyboard], almost like pasta. The fear got me up and I started running. I felt very crowded. The keys were all separate from the board, and just kind of flying around. Everything I could see was just this mass of gray with ivory keys, like marshmallows in fudge. The keys were the only thing that made me realize that this was the computer technology, and this is how much energy was coming out of it.

"I remember feeling a great sense of fear. Not necessarily of them [the computers] taking me over, but of my not being able to keep up.

"I'm sure the minute I started running I woke up. I always do that. I think the energy was my own fear, the anxiety over being able to learn something new. I guess I just saw them [computers] as so much larger than me.

"There's still a funny feeling when I come in [to work] and I wonder if these things are alive!"

Betsy Byrne, *33, lives in Albuquerque, New Mexico, and is a freelance writer and the mother of four. She is president of the New Mexico Commodore Users Group, and writes frequently for* FAMILY COMPUTING. *A hunt-and-peck typist, she realized her desire to be a writer after learning to word process. She thinks this dream may be a symbol that her computer "is my medium of communication with the world."*

"The funny thing is that when I dream about computers," says Betsy, "people are very seldom in the dream. The computer takes on personalities. It becomes a real person that I know, and rather than talking to that person I'm word processing to them. They respond the same way—their words appear on the screen. I've had this kind of dream at least two or three times. People are going to think I'm nuts!

"It's like talking through a modem, but it's so different. I could just sort of feel the person's presence through the screen. Almost like the person *was* the computer. Maybe I was the computer too, I don't know.

"It's very peaceful, like I'm in a small place, not paying attention to anything other than that person

ILLUSTRATIONS BY JOSH GOSFIELD

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there in the computer. There's sort of a warm glow around the whole computer area.

"I can't really recall any of the conversations. They didn't make any impression on me when I woke up.

"PEOPLE ARE GOING TO THINK I'M NUTS!"

What *did* was my feeling in the dream that this was so normal. It was like this is how people talked. They no longer used telephones.

"It felt good so I don't think it's anything that's wrong. It probably comes from a very powerful feeling that I can get in touch with anyone I want to through the computer terminal."

John Jainschigg, *27, lives in New York City, and is a contributing editor to* FAMILY COMPUTING. *Frequently on deadline, he relies on the smooth running of his Epson printer.*

"In one dream I had recently," John recounts, "I dreamed I had been up all night and through the morning. I vividly recall the kind of artificially-wired sensitivity that you have when you've been deprived of sleep.

"The sunlight was overly harsh and bright, and I remember that it hurt my eyes. In front of me was the glazed screen of my video monitor, which was a particularly obnoxious shade of blue. The red pin lights were glowing on the various components of my Atari 800 system. And I remember thinking very clearly in the dream, 'Why does my printer have a green light, when everything else has red lights?' My printer does indeed have a green light, but the fact that I would think that was significant in my dream might interest a psychoanalyst!

"I was writing an article on deadline and was about ready to print it out. I was already two or three hours past deadline when my printer inexplicably malfunctioned.

"My Epson is a robust printer and when it malfunctions it makes loud and horrible noises, which were amplified in the dream. My impression of the printer malfunctioning was superstitious, in a way that I don't normally treat computers. I'm not usually guilty of any anthropomorphism in regard to them. But it was as if the printer were deliberately malevolent.

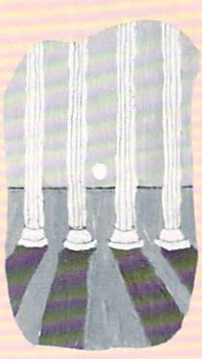
"It started printing normally with a growl and a rush, and then it started shooting the paper up out of the back in waves, with one line of my text printed on each page. Now this file I was planning to print was 15-to-20 pages long, so before I was able to stop the printer it had completely destroyed at least 100 sheets of paper.

"As I watched I felt helplessness, panic, and I suppose guilt for having pressed my deadline so far. And at that point the tension of not being able to meet my deadline and having something wrong with the printer was so extreme that I woke up in a cold sweat. It was about three or four o'clock in the morning. My first feeling upon waking was wondering whether I had done a good enough job on the article I had just finished writing!"

Mary Ellen Johansen, *24, an English graduate student at the University of Texas in Austin, knows "absolutely nothing about computers!" She often has "major, technicolor dreams" about things she has glanced at for a brief second during the day.*

"I've never had a dream about computers," says Mary Ellen, "but I did once have a dream about Steven Jobs [chairman of Apple Computer]! I had it early this year, when he was on the cover of *Fortune* magazine [February 7, 1983]. On the cover he was standing with his finger-

EDITOR'S DREAM



One Saturday, in the middle of writing this piece, I took a nap. I woke up and realized I had had my first dream about computers.

The dream started with me in the middle of a large public square in Rome. The sun was setting behind the columns that lined the perimeters of the square, giving everything a hazy, musty rose color. I was sitting on a stone bench. An Englishman was seated on a nearby bench, and his female companion's face was completely concealed by her large, blond, bouffant hairdo. I was crying. As the man's eyes and mine met, I could see that he was crying, too.

All of a sudden my attention was diverted to my right, where at the bottom of some steps appeared a roofless boxcar, speeding along invisible train tracks. It was a rickety old train on the exterior, not at all streamlined. There must have been windows along the sides, for I could see that inside it was very light and modern. Neatly arranged in the train were computer keyboards. What was odd was that next to each computer was a black umbrella, the type the British often carry. And behind each computer was a faceless nun in a flowing black robe.

Then I was at the front of the boxcar, like a figurehead on a ship, watching the view spreading out before me. The sensation was one of flight—very smooth and relaxing. To my right was a large, natural rock formation that rose up as far as I could see. I looked to the left and watched a succession of interlocking buildings flying past. The buildings were in England, and the brick was often obscured by trees and ivy. A wide variety of portals, pillars, and detailed black ironwork connected one building to another. If I desired more detail, it miraculously appeared.

When it occurred to me that no people were in the scene, I immediately saw a modern, aluminum-frame window. The window was a square of yellow light in between the lush foliage. Inside the sterile room was a gray-bearded man, whom I figured to be a college professor. He was absorbed at a computer. Soon this same man and this same window dotted the architecture.

And then I woke up.

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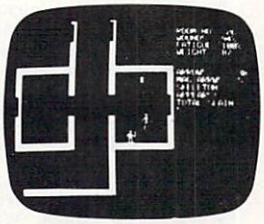

TEMPLE OF APSHAI (computer game of the year)
This is the standard by which other adventure games are judged. Full color graphics portray the temple and all its contents - magic, monsters, doomed cities and damsels in distress. Do battle in real time with over 20 monsters, expansion modules will keep your adventure alive in the future.
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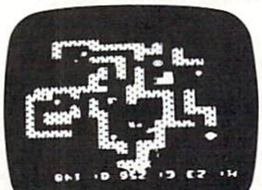

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Search for the wondrous sword in the depths of an ever changing dungeon. Make yourself invisible, teleport to a new location, drink a healing potion or use enchanted treasures, but watch out for traps and hideous creatures who will try to stop you. (Fantastic dungeon adventure)
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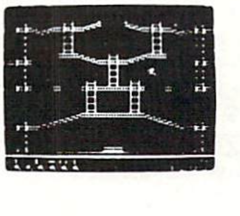

JUMPMAN JUNIOR
The devilish ALIENATORS are back! And they have overrun the Jupiter Command Substation. In this cartridge format sequel to the best-selling Jumpman, players must leap through 12 all new screens featuring electrocution traps, moving walls, hellstones, and dangers much too bizarre to be believed. How many screens can you master? Twelve different screens, 8 speeds.
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tips touching, sort of in a prayer-like gesture, or as if he was going to bow—like an oriental hello. I think that's what triggered the dream. Because in my dream he was sort of mystical, not at all like a computer

"IN MY DREAM HE [STEVEN JOBS] WAS SORT OF MYSTICAL."

whiz kid, but sort of like a benevolent Buddha. He was watching out for me, but I don't know why.

"I think the dream stemmed from my curiosity about his background and his philosophy, which I had been thinking about after reading the article. He just seems to me like a very peaceful guy who sort of understands himself and a little bit about other people and what is going on.

"In the dream we were sitting down, speaking face-to-face. I don't think the conversation had *anything* to do with computers. Mostly I remember a voice, speaking to someone.

"In the other scene I remember him putting his hand on my back as if to guide me across the street—it was that kind of movement. There were people around, it wasn't a void. It was in a concourse. He was guiding me on to an escalator. I don't remember if we were going up or down!

"And those are the only two situations I can remember. The next day when I saw the magazine again, I remembered that he was in my dream. And it was strange because it seemed like I knew him. Like I had shared something with him.

"He was never in my dreams again."

Kahni Zinkus, *38, is a computer consultant, instructor, and programmer, and the father of a two-year-old. Born in Santa Barbara, California, he now lives in Crescent Beach, British Columbia, Canada. One day he may spend 12 to 15 hours at one of his four computers, "other days I hardly even touch them. But sometimes just sitting outside and staring at the ocean can give me more of a feeling of progress than sitting down and pounding at the machine." How many of his waking hours are spent thinking about computers? "I'm sure my wife would say too many! Pretty close to all of them!"*

"I dream about computers all night long every night," says Kahni. "The one dream that gets me is when I wake up realizing that I've been working as a programmer in a space colony! It's not an unusual dream for me to have.

"My dreams are more like thought patterns, rather than actually seeing anything at all. Mostly it's a case of engaging in straight debate. Maybe it's something that happens to you when you've been a programmer for a while.

"In my dream I had something to do with keeping a fairly large computer in the colony comfortable. I don't know what that would make me, a computer psychiatrist or some such thing!

"I was trying to convince the computer that it was all right to take a holiday and come down to earth. Don't ask me why; in dreams you never bother to question things! I was trying to figure out how to explain to the computer that all sorts of people did it, that it wasn't anything to be embarrassed about. You didn't have to be a die-hard dedicated member of the space colony to the point where you completely separated yourself from earth. But the machine just wasn't buying it.

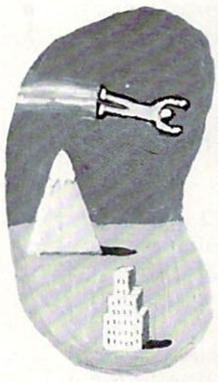
"I don't remember the actual details of the conversation, but I woke up very dissatisfied. I had gotten absolutely nowhere. I guess fanatics are just not easy to convince of anything. But there was an emotional need on my part to communicate with the computer.

"While I was talking to the computer I was remembering going up and down to earth in some sort of shuttle. I was trying to think of whether the computer was going to have some emotional problem with reentry. In my dream I decided it wouldn't. I now realize, in my waking hours, that getting a computer of that size into a shuttle is out of the question, period! But at that time I was thinking of the computer more along the lines of some person.

"Something that has just occurred to me is that maybe the computer was *me*. And I was using the computer as a foil to talk to myself, to allow one aspect of my subconscious to talk to the other, without feeling that I was criticizing myself. Perhaps it really had nothing to do with space colonization at all. Maybe it was something telling me when I had the dream that I was overdoing it: 'Why don't you come down to earth once in a while?'

"When you think of all the hours I work, it's interesting! Perhaps I should spend more time thinking about my dreams!"

Dave Morice, *36, is a computer typesetter at the University of Iowa in Iowa City, Iowa. His real dream, he says, is to be able to play video games on his computer terminal at work. [See Reader-Written Programs, page 121.]*



"In my dream," begins Dave, "I was sitting at my computer terminal at work. It looked like the normal work scene except I don't remember any color outside of what was on the screen. And somehow I had found a way to log into a video game. I like to play video games, but this one was more enjoyable than any video game I've ever played.

"I kept thinking, 'People at work are going to see this and I'm going to get into trouble!'

"It was a perfectly silent dream. I wasn't scoring points or anything. It was like I was the cursor flying along through this colorful landscape in the terminal. The landscape was really vague. It had mostly a mountainous thing in the background, which is probably influenced by a couple of video games I've played. There were rock formations and some buildings every now and then. There was a real blue sky, only with words and letters on it.

"When I moved the cursor to the right, the background would move to the left. Like in the old movies, when they show somebody sitting in a boat and the backdrop is moving past them. And it always seemed like I was flying from left to right, which is the direction we type. I could see the screen only one size, but I could

experience it being much larger.

"The really different thing about it was that by flying the cursor I really had a sense of flight myself, though I never entered the screen. I could go faster or slower with the cursor, but I would never land. And I could press certain buttons and it would blip the screen into a new landscape for the cursor to fly around in. It was so much fun to fly through these things!

"And then I woke up."

"THIS WAS MORE ENJOYABLE THAN ANY VIDEO GAME I'VE EVER PLAYED."

Jonathan Franklin, *17, lives in San Francisco. He had this dream during his first year at school out East, when he was adjusting to the loneliness of living so far from home. His heavy involvement with computers was the only "bright spot" in his life at the time, he says.*

"I don't dream about computers anymore," says Jonathan. "But I used to when I spent a lot of time around them. One dream was pretty memorable.

"In the dream I was walking along a path on the way to class. All of a sudden I sort of disappeared—the way dreams take you out of places and put you where they want—and I was inside this maze. It was like being a mouse in one of those scientific tests. That's all I could think of: 'Oh boy, I'm being played with now!'

"I was at a four-way intersection. The walls were so tall that I never thought about them—they just sort of went up and up. I felt confused: 'What am I doing here? This isn't my class.'

"I picked the corridor with the longest route, and decided just as a reference that that would be north. I couldn't even see the end of it. It was odd colors: purples and deep blues and greens, all melding into one another.

"I got to one point and there was this little spot of orange on the wall. It was really strange: Here was this dark, gloomy corridor and just one little orange spot. As I kept on walking the spot started getting larger, until it was a big thing, but instead of being a spot on the wall I could walk through it. This was the first time I could actually get out.

"On the other side was this large, 2001-ish monolith computer. And behind it there was a branching of small corridors, like a family tree. The maze was orange-colored at this point. The whole feeling of this area was such a contrast to the dark corridors; it was like a bright corner in this huge picture.

"I continued walking. I remember seeing a printed circuit board, and a screen, not like a TV screen but the actual Cathode Ray Tube, just sitting there in one of the corridors. And as I went on it became a fan, and then an electric plug, and then it just started getting smaller and smaller until I came to little bits of chips and solder, the smaller parts of a computer. The weird thing was that I never put together that all these things were part of a computer until I woke up.

"When my alarm went off, somehow there was a bell in the dream.

"Whenever I remember a dream I try to figure out what it was saying. I wasn't very successful with this one. All I could think of is that here's a bright spot, here's a place to escape. I wasn't a very social person then, and the computer room at school had become a definite retreat, where I'd spend ages and ages."

John Streber, *26, is a production worker in Rochester, New York. His dream computer house has not yet been realized, but he's working on it: He recently bought his first home computer, an Atari 800.*

"When I was little," says John, "I always wanted to have a job that had something to do with computers. And a lot of times at night I would dream that I had one [a computer] in this futuristic house. It would run the whole house. It was a lot like [the TV cartoon show] 'The Jetsons'!

"The last time I had the dream was probably 10 years ago. But you know how you have certain dreams that you always remember? It was one of those.

"In my dream I was walking up to a door. On the outside it was a regular brick house, like a colonial brick house. I don't know why I had the sense it was my home, because it wasn't anything like my parents' house. But I knew it was my house; I was very comfortable there. It's like I always belonged there and I always would.

"When I went to put the [front door] key in, there was no keyhole. There was a keypad on the side of the front door. I punched in some buttons, and as I did the numbers appeared on top, like on a calculator display. But instead of opening like a regular door, the front door slid into the wall.

"The lights came on in the foyer when the door opened up. The dream was in color but most of the inside of the house was white. I was always alone in this house. The inside was real futuristic. There were doorways but no doors. The lines of the house were very clean. There was not a lot of ornamentation on the walls. It was kind of sterile, but very comfortable.

"When I walked into the living room the light went on in there and went off in the foyer. In the living room there was this huge flat TV screen-type thing on the wall. There was a table in front of that, with a keyboard sitting on it. I don't understand how the keyboard was hooked up to the TV. It was like when I came in I wanted to watch TV, so the TV came on. Like when I walked in the house the lights came on, automatically.

"I was walking but I felt very good, not like when I usually walk. I was real happy, but it was also very normal at the same time.

"I typed in something, I don't know what, into the keyboard. And instead of watching TV, the newspaper came on. I don't remember anything that was in it, just that it was there, and that I was reading it. I was real content, being in my futuristic house! That was the end of the dream.

"At first, I would be real happy when I woke up. And then I would look around and realize where I was and get depressed! It had been like a dream place; it was what I really wanted. There was nothing else around it, no problems." FC

COMPUTING CLINIC

COMPUTER INSURANCE/ FIFTH GENERATION TECHNOLOGY/ TWO TYPES OF CASSETTE TAPE

BY WALTER KOETKE

How will tape with leader affect my ability to store programs?

Tape quality is unrelated to the presence of leader (the beginning section on some tapes where data cannot be stored), hence you should find no difference in storing data on these tapes. You must, however, remember to move the tape past the leader, because the computer can't tell where the recording portion begins. Since this will quickly become an automatic procedure on your part, the disadvantage is minimal.

Tape with leader dominates the stereo marketplace, and is significantly less expensive than leaderless tape. The result will be more storage for your dollar if you use tape with leader. The latest computer cassette tapes are leaderless, and are more expensive than audio tapes. Computer-tape manufacturers say their tapes are superior to audio tapes for computer use, but in my experience the audio tapes work fine.

Does it make sense to ask my children to learn programming before using commercial software?

Not really. While there are many good reasons for learning to program, none are prerequisite to using commercial software. Learning to program requires—at the least—learning the words and rules of a programming language, as well as how to carry out often-used procedures with that language. Good programming requires persistence, attention to detail, and both analytic and creative problem-solving skills. Knowing how to program will make you a more critical, but not necessarily a better, user of commercial software.

For many children and adults, there's no real need to learn how to program. For instance, you can acquire a complete working knowledge of a word-processing or spreadsheet program with no programming experience. The computer can then be used as a powerful personal or professional tool. And, for those who want to program, this working knowledge of program types serves as a model to emulate.

WALTER KOETKE *was the first to introduce computers to U.S. public schools, linking the Lexington, Massachusetts, system to a mainframe in 1964. In 1969, he worked with Dr. Seymour Papert, inventor of LOGO, to introduce that language to the same school system. Koetke frequently lectures about computers to parents and educators.*

In looking to expand the RAM in my Apple IIe, I've come across the term *bank switching.* I'm told that I can expand from 64K to128K bank switched. What does this mean and how useful is it?

One way to make more memory available is to add an additional 64K "memory bank," and then provide a "switch" so the computer can address either (but not both) of the two 64K banks. (The 6502 microprocessor in your Apple IIe cannot directly address more than 64K of RAM at one time.) Hence the term *bank-switching.* Because each 64K memory bank retains its data while the other bank is being used, you can make full use of all 128K within a single program.

Nothing, however, is ideal. The switch is controlled with software and is not incorporated into more than a few commercially available programs. Unless you wish to purchase a particular software package that requires 128K and has the switch built-in, the extra memory will not be used. (You can also program the computer to switch between banks if you know assembly language.)

What does "Fifth Generation" mean? It sounds like a rock band.

Generations of computers are labeled for the technology on which they are based. So far we've gone from (1) vacuum-tube computers to (2) transistorized computers to (3) integrated-circuit computers to (4) VLSI (Very Large Scale Integration) computers. Your microcomputer represents the end of the third generation, while today's mainframe computers represent the fourth generation. The fifth generation will be a computer based on yet another technology.

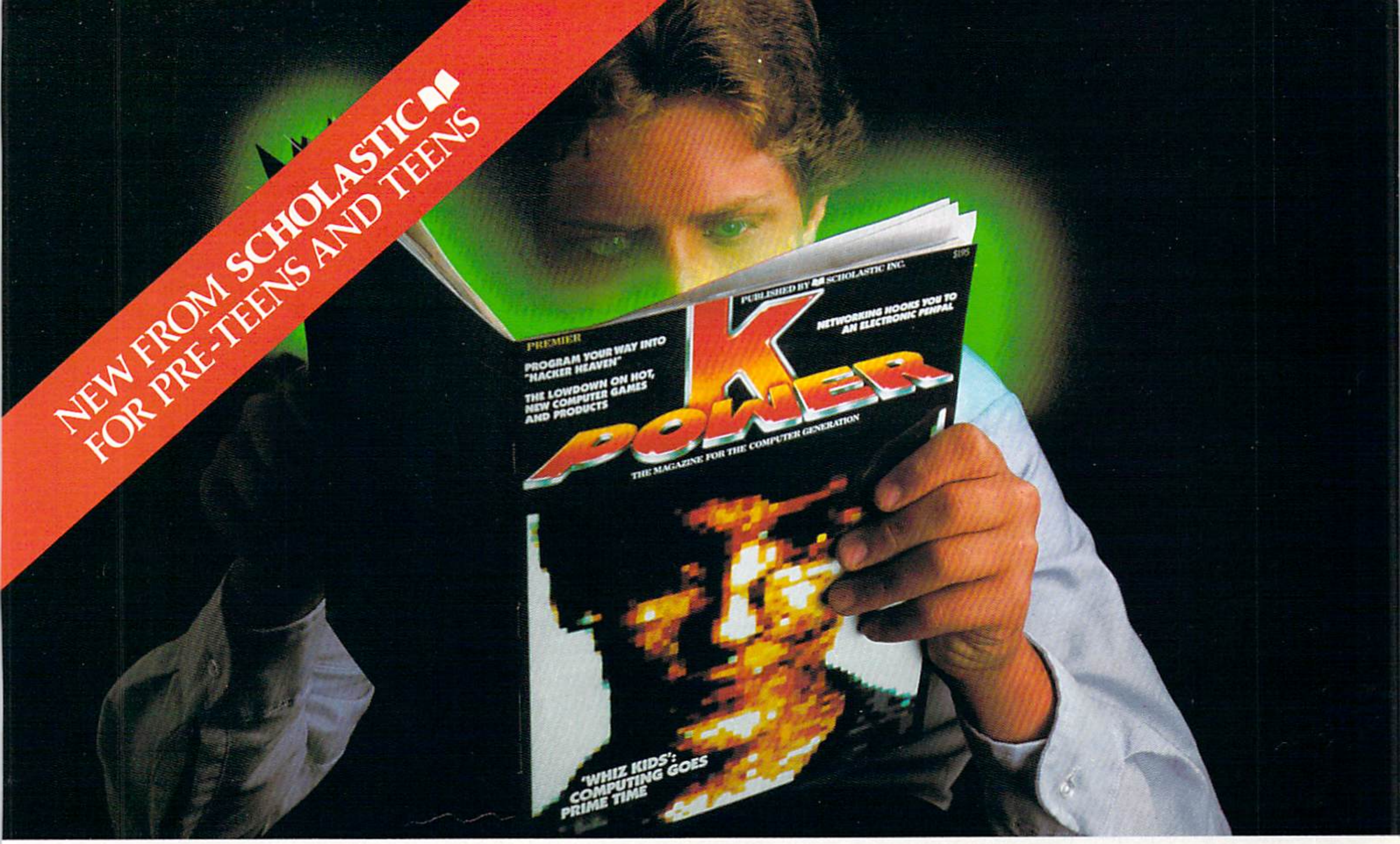
Japan has already undertaken the formidable task of developing fifth-generation computers. These fifth-generation machines are envisioned as being so different from today's computers that they've been given a new name—Knowledge Information Processors (KIPS). Their technology, concept, and function will all be new. Because they will be based on reason rather than calculation, some will understand the written and spoken word, and be able to examine data, make inferences, and logically defend their conclusions. These computers will be artificially intelligent, and in some respects will exceed human intelligence, according to many usual measurements.

Fifth Generation, by E.A. Feigenbaum and P. McCorduck, a well-written, knowledgeable, and provocative book, describes the fifth generation and its implications. I recommend it. *[See review in What's in Store/Book Reviews, p. 148.]*

What in the world is a buffer? I understand most of the computer buzzwords, but not this one.

A buffer is a storage area that temporarily holds data being transferred from one device to another. Buffers are generally used when one device, such as a computer, can transmit data faster than another, such as a printer, can use it.

Because printers are many times slower than computers, printer buffers are popular peripherals. Functionally, the computer thinks the buffer is a printer and the printer thinks the buffer is a computer. The computer transmits data to the printer buffer at very high speed, and is then free to be used for other tasks. The printer buffer then transmits data to the printer at the appropriate slower speed. If you do a



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COMPUTING CLINIC

lot of printing, you should have your local computer store demonstrate a printer buffer for you. I find my own printer buffer to be an almost essential part of an often-used computer system.

I want to insure my home computer. Do I have to purchase a separate insurance policy or pay an additional premium on my present homeowner's (or renter's) insurance policy?

The most likely reasons for losing your computer hardware are theft, electrical power surges, or spilling foreign substances on the keyboard. In general, the standard home, apartment, and even business insurance policies are of little help. If you're covered at all, you're covered only for theft (and for natural disasters such as fire, flood, etc.) and for only the depreciated value rather than the replacement cost of your computer hardware.

Even if you occasionally use your computer for business purposes, most standard home and apartment policies offer no coverage. Those that do won't offer anything if you can't document your loss. If you haven't retained receipts for purchase, then take some pictures and record all serial numbers.

There's even more discouraging news. Virtually no standard insurance policy covers even the depreciated purchase price of software packages against any types of loss. Since the value of your software library can easily exceed the value of your hardware, you shouldn't overlook the possibility of loss.

On the brighter side, at least two companies write reasonably priced personal computer insurance that covers many types of hardware and software loss. These are: Columbia National General Agency, Inc., 88 E. Broad St., Columbus, OH 43215; and Personal Computer Insurance Agency, 1655 Willow Street, P.O. Box 28506, San Jose, CA 95159. You should also contact your local insurance agent for specific information on the policy you already have and additional coverage that may be available.

Advertisements for printers and modems use the term *baud rate*. The figures I see most often are 300 baud and 1,200 baud. What does this mean, and what's the norm for these peripherals?

Baud rate is a standard unit for measuring the speed at which computers and peripherals transmit data—just as watt is a standard unit for measuring electrical power. A 300-baud line can transmit 300 bits (binary digits), or approximately 30 characters per second. A 1,200-baud line can transmit 1,200 bits, or approximately 120 characters, per second. The higher the baud rate, the faster the line is capable of moving data.

But don't pay for more speed than you can use. If you plan to use your home telephone line with a modem, a 300-baud modem is your best bet. Higher baud rates don't always work well over standard phone lines. For home applications, a 1,200-baud printer is probably fast enough, unless you're using word-processing software to produce the Great American Novel.

Send your questions, either machine specific or general, to:
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How to get in touch

KoalaPad™ Touch Tablet puts the controls at your fingertips.

Paint the screen with colorful graphics or play lightning-fast games with just a touch of your finger. The KoalaPad™ Touch Tablet makes using your computer more fun than ever before. Just moving your finger across the special touch-sensitive surface controls graphics, game commands, and much more. It's a great way to get the most out of your computer while you just sit back and

PRESCHOOL COMPUTING: What's Too Young?

BY SALLY REED

Kids as young as two and three are already at the computer keyboard in many homes in the country. In this special report on the preschool phenomenon, FAMILY COMPUTING:

- Looks at one home in Madison, Wisconsin, where children as young as two and four use the family computer;
- Interviews a professor of family studies about the concerns parents of young children have today;
- Takes a look at what other educators say about the issue;
- Offers tips on using a microcomputer with young children at home; provides guidelines for buying software for preschoolers and short programs to try with youngsters.

PHOTOGRAPHS BY MICHAEL KIENITZ


UD 8856

On South Shore Drive

TWO PROFESSORS AND THEIR TWO PRESCHOOLERS SHARE A COMPUTER— IN THE FAMILY ROOM.

Is two too young to compute? Not for Josh and Andrew Dickson. They convinced their parents that young children can learn a lot with microcomputers. And they are only ages two and four!

In a blue, two-story wood-frame house, sitting on the shore of Lake Monona—one of four interlocking lakes in Madison, Wisconsin, that give the city of 172,000 its charm—there's the usual collection of paraphernalia found in a home with young children. A miniature, metallic-green John Deere tractor is parked precariously in the driveway. A wooden jungle gym set, along with a sand box, sits in the backyard. Inside the house, the family room is filled with plastic blocks, *Little Golden Books*, macaroni-pasted-paper masterpieces . . . and an Apple II computer system.

A computer? For toddlers? Yes, here in their family room, W. Patrick Dickson and his wife, Penelope Peterson, both professors at the University of Wisconsin at Madison, meet daily with sons Josh and Andrew to play, to practice counting, to learn letters, and to draw.

Josh is two years old. Andrew is four. And neither parent ever imagined the youngsters at the computer keyboard at this early age.

HOW IT ALL BEGAN

When Pat and Penny purchased their Apple II two years ago they imagined that their kids might become interested in it when they were older, once they were well into school. Like most experts in early childhood education, Pat was skeptical that any preschooler could harness technology as sophisticated as a microcomputer. And he wasn't sure why he would want any of them to try.

Pat used the Apple as a word processor to help with his writing and research as associate professor of child and family studies in the School of Family Resources and Consumer Science at the university.

"I was teaching child-development classes," he said, "and reading all the literature and doctoral dissertations emphatically stating that young children under the age of five could not operate a standard keyboard."

Yet when Pat sat perched before the computer keyboard each night, 18-month-old Andrew would crawl onto his lap. "I was astonished at how quickly he took to the computer," said Pat, "and at how much he could do at an extremely early age."

Andrew started turning on the machine, loading the disk drive, and punching the keyboard. One day Pat brought home a program featuring LOGO, the software language designed by Dr. Seymour Papert of the Massachusetts Institute of Technology's Artificial Intelligence Laboratory to teach elementary-age children to program using graphics. Pat wrote a short program in LOGO allowing him to draw by pressing single keys and started to show Andrew how to make a square. But Andrew asked his father to move aside. "I'd rather do it myself," he said.

That moment changed the Dickson-Peterson household. They became a computing family. Without prompting from his father, Andrew pressed the keys until the graphic "turtle" completed a square on the screen. "When it was completed Andrew's eyes opened wide," his father said. "He clasped his hands, opened his mouth, and let out a shriek of delight. It was a profound moment. I was astonished not only at his sustained attention and obvious gratification, but because if you had given him a crayon he could not have drawn a perfect square. But the computer became for him an intellectual tool. Obviously he had already visualized a square in his head. The computer was then a window on his mind."

In no more than a few trials thereafter, Andrew learned how to operate the space bar and key letters. Today, Andrew is four years old and the master of several computer programs. He now assists brother Josh, age two, at the

keyboard. And he inspired his father to do more scientific research on the impact of computers on preschoolers at the University of Wisconsin Laboratory Preschool.

"Initially, I thought the computer was a waste of money," said Penny, a professor of educational psychology. "I've used mainframe computers in my research, so I wasn't afraid of the computer. But I wasn't sure what we would do with one at home. I've read of people who store their recipes on a home computer. But I thought it was ridiculous to spend thousands of dollars to store recipes.

"I no longer think like that. I see definite advantages now for the kids. It's been really great. Their use changed my opinion."

WHAT DO JOSH AND ANDREW ACTUALLY DO?

Andrew began by practicing his letters. "He knew his letters early, as many kids today do,"

Working together at the computer is like any other family activity—it will be a much richer family experience if parents spend time with their children.

said his father. "But there was nothing he could do with them but make his parents smile." Once the computer entered Andrew's life, "it gave him a sense of power from knowing his letters," said his father. Now he could practice his letters on the keyboard.

From simple tasks such as learning to turn the machine on and off, putting the disk in correctly, and taking it out, Andrew went on to commercial software. Pat had his son concentrate on the educational programs.

These programs reinforce the names of colors, letter and number recognition, sounds, and vocabulary words such as *up, down, inside,* and *outside.*

Andrew and Josh use an Apple II, two disk drives, an Epson printer, and a black-and-white monitor. (There is also an RF Modulator to hook to the color television set.)

Both boys now use a commercial program called *Hodge Podge.* [*See "Software for Preschoolers," page 66.*] It teaches the letters of the alphabet, and uses sound and graphics. When Josh, for example, punches an "A", an apple appears. If Andrew punches "H", a horse appears and the song, "Camptown Races" plays. "Z" is Josh's favorite. That's when "zig zags" crisscross the screen.

There are no right or wrong answers with *Hodge Podge.* The boys could play it for hours. "With this type of program children learn letters," said Penny, "but, more important, they get a sense of control of the keys."

Another commercial software program the boys use is called *Counting Bee* (designed by a father who was frustrated because he couldn't find software for his young children). It doesn't actually teach Josh and Andrew to count. ("The computer does not teach new things to young children well," noted Pat.) What it does do is provide drill-and-practice for kids who may already know how to count.

For example, at the Woodland Montessori School where Andrew goes each day, he had been learning to count, "but his counting was inconsistent," his mother said. Once he was captivated by *Counting Bee,* the drill-and-practice gave him a better grasp of the subject and increased confidence. With *Counting Bee* he may count the number of triangles, squares, bouncing balls, and circles on display. When he is right, he gets a smile on the screen. If he is wrong, a buzzer sounds.

"*Counting Bee* is an example of the right software at the right time making a difference to a young child," said Penny.

Andrew's favorite now is a word-processing program called the *Bank Street Writer.* Initially he dictated stories for adults to type in, but now he is writing by himself. He creates his own stories and prints them to make "books," which he likes to have read to him. In all he must complete 13 steps before finishing a story. The "books" have gone to grandparents in Atlanta, and the activity is a favorite with the babysitter.

"Writing letters is very laborious for a child," said Penny. "But this exercise relieves that. I think this is how Andrew is going to learn to read—through writing."

Other educational programs enable Josh and Andrew to select certain tasks from the screen through visual cues. They may match letters and numbers, identify shapes, count and name, practice recognizing "same" and "different."

HOW THE TODDLERS RESPOND

As the boys work they ask questions . . . and more questions . . . of the babysitter, of their parents, of any observer, of each other. Josh responds with delight when the screen lights up. He laughs, he pauses in amusement. He sometimes pats the machine—or slaps it.

Two-year-old Josh approaches the latest technological wonder with the confidence of a test pilot. For him, turning the computer on, pressing certain keys, and making things happen on the screen are ordinary events. He appears to regard his new-found ability to ride the toy tractor as more of an accomplishment than being a computer wizard.

But what does Josh really know? He knows the names of the various keys and how to discriminate between them. He knows how to open the disk drive, close it, and turn the machine on and off. When the screen scrolls up on a program like *Early Games*, he can select what he wants to do by pressing the appropriate button.

While Josh knows how to count, he doesn't yet recognize his letters or the shapes of the letters. This is when he turns to his older brother for assistance.

Even by adult standards, Andrew is something of a pro. After all, he's been at the computer keyboard for two years now. True, Mozart created musical compositions at age five. But Andrew is no child genius, his parents claim. "He is not unique," said his father. "A wide variety of children in the laboratory preschool have taken to the computer equally well."

Indeed, Andrew does seem like your typical four-year-old kid. He's not overly precocious. He'll take the beach over a machine any day. He will readily demonstrate new tricks on his swing set, and he's always ready to lend a helping hand during meal preparation.

Yet, it is awesome to see this little tyke sit in front of a screen, constructing buildings on a drawing program as if he were at a NASA control panel. With determination and concentration, he'll construct tall buildings with a "click, click, click," of the space bar. Line after line, changing colors as he goes, he works and he works. When he is finished he gives his drawing a code and stores it for the future. Then he recalls another building he made the previous week. He has a few corrections he'd like to make.

Andrew is your typical, but modern, four-year-old.

THE PITFALLS

This is not to say that computer use with young children is not without problems. If Josh makes one false move and presses the wrong key, an entire program can "crash." And since he doesn't have all the commands under his control yet, Josh sometimes turns off the machine impulsively, losing the pictures he has drawn.

Then too, some of the commercial software programs are too complex for young kids. Or they make connections few adults might follow. Even *Hodge Podge* asks a three-year-old to make the association from the letter "O" to a straw hat which stands for "Oh, Susanna."

There are some critics who argue that any computer use by preschoolers is too much too soon. Pat is examining some of those issues in his research [*See "Practicing What You Teach," page 60*.] He claims that contrary to some thinking, young children are actually more social and interactive when they use the computer. And, Pat claims, for many parents the issue is a *fait accompli*; with more than seven million new computers moving into homes over the next year, many are already in the hands of young children. And then, the question parents face is how best to work with their youngsters.

The phone rings late one evening as Pat Dickson prepares his sons for bed. It's another parent wondering how to use the micro with her three-year-old daughter. By now, after countless speeches and phone calls from all over the state, Pat knows what to say.

"Start with *Hodge Podge*. Do the program with your child," he says as if prescribing a medicine. "Consider learning simple programming yourself so you know how it works. Read the tutorial books on your machine. And, remember, some kids just don't take to it—and not all of them should. Childhood *is* childhood.

"So, don't push it. When kids see their parents using a computer to do interesting things, they see a model and become interested. I certainly never thought my sons would get involved with a computer at such an early age. But with the computer here to stay, the odds are many young children will take to it."

Pat adds a final word of caution: "Youngsters shouldn't be left alone at the machine. If your children show an interest in the computer, you really have to work with them. Even if you could leave them alone at the computer, it will be a much richer family experience for you and your children if you spend time with them." FC

Since Josh doesn't yet recognize his letters, he sometimes turns to his older brother Andrew for help.

SALLY REED, *a Chicago-based writer and editor who specializes in education, has written for* The New York Times, Better Homes and Gardens *and* Ms.

Practicing What You Teach

AN INTERVIEW WITH PROFESSOR PAT DICKSON

Two years ago, Pat Dickson's 18-month-old son showed him how readily toddlers can take to a computer. Now Pat is doing research at the University of Wisconsin on the impact of the microcomputer on young children.

BY SALLY REED

W. Patrick Dickson cares about kids . . . not just his own two young preschoolers, but those in his neighborhood in Madison, Wisconsin; at the University of Wisconsin Laboratory Preschool where he does research; and in the thousands of homes where, he predicts, infants will face micros for the first time this year. As associate professor of family studies at the University of Wisconsin, Pat makes it his business to look at the impact of the computer on the minds, nay the souls, of America's toddler set. That's why FAMILY COMPUTING *found him such a perfect resource for discussing the issues confronting parents of young children today.*

Q. Pat, few people would believe that two-year-olds could physically manipulate a computer keyboard. Why are you so sure they can?

A. Two-year-olds have perfectly good control in their fingers. They can pick up objects as small as a raisin, for example. So it's wrong to think they need special keyboards or adaptations. Their little hands can work many of the computers now in homes. Also, two-year-olds are used to pushing things. Thus they can learn to touch a key and see something happen. Then, once they develop a sense of discrimination, they can learn to make choices.

Q. What did your research on computers and young children at the University of Wisconsin Lab School examine?

A. We asked, could preschoolers use the microcomputer? Could they share? Would they do something other than play games?

Q. What were the answers?

A. Yes, to all three.

Q. What did you conclude from that?

A. You get much more teaching, sharing, helping, encouraging between two children at the microcomputer than in any other activity, such as finger painting or sand box play, in the preschool. Kids cooperate with each other. They talk to one another, ask more questions, ask for advice, and give each other feedback.

This is important for families in which there are few joint projects that foster cooperation. When parents and kids work together on the computer there *is* cooperation, joint problem solving, and, even more important, a lot of talking.

If parents choose the right software they can provide a cooperative environment that will make kids more socially interactive and verbal.

They can create a rich linguistic social environment in which kids can learn.

Q. **Why is drawing on a computer such an important activity for a young child?**

A. It makes drawing a fun, exciting domain. It activates the imagination the way nothing else can. Sure, kids talk about the pictures they've drawn on an easel. But the computer gives them a technological dimension and a means of striving for greater precision.

Q. **Why is that important?**

A. Well, for example, when I was doing research a few years ago in Japan, I studied the art work of their five- and six-year-olds. It exceeds the capability of many of our adults in the U.S. People think it's something genetic. It's not. It's a conscious training.

In our preschools we tend to view art as expressive—an outpouring of emotion. So we give kids big brushes to paint with. That may be right, but that is only one experience. Another is to make a sustained commitment to something creative that you work at and revise. There are Japanese who argue that they do this to the extreme. And American parents may say, "That will make my child compulsive. I don't want to push him." But the computer enables young children to devote sustained attention to art that they wouldn't and couldn't do otherwise.

Q. **What real benefits do you see from this?**

A. On a computer a child can call back his work and make revisions. Children get a sense of perfection they wouldn't get otherwise. That's not to say they shouldn't color with crayons or anything else. But the real argument for drawing with color crayons is that it develops eye-hand coordination and muscle development. It is an aesthetic experience, but it's also laborious.

When you take the labor out of drawing, it can be a much more powerful emotional experience and an unleashing of creativity.

Thus, using the computer to draw is not better than using color crayons. But it gives children a sense of pride. It is a feeling many adults get when they produce something on the computer that is letter quality. It looks nice.

Q. **Are some young children more attracted to the computer than others?**

A. Some of the early research suggests that boys, in particular older boys, are more involved with computers than girls. But this is less true at the preschool level.

Q. **Why is this?**

A. The use is tied to the software, not the interest in the computer *per se*. Much of the software for older children has them blasting asteroids out of the sky. Older girls report that this is "boring." But at the preschool level that type of software hasn't developed yet so there hasn't been a division along sexual lines. Where teachers or parents provide good software and a supportive environment, girls are just as interested in the computer as boys are.

Beyond that we don't know how to predict which children will take to the computer. Some children want to use the computer every chance they get. For others it is only a passing fancy. As yet we don't know why.

Q. **Should parents buy a micro simply for the sake of their preschoolers?**

A. No. That would just be a waste of money. The software is still too limited, and parents are likely to be disappointed if their youngster isn't interested in the machine. The computer should have other uses in the family and not just be an expensive toy for a toddler. If parents already own a home computer, they can encourage their child to experiment. If there's no interest, it might be because of the software used. When good software is used, few kids are not interested. Get programs based on things children like to do. A drawing program, for example, could be a good investment for a child who likes art.

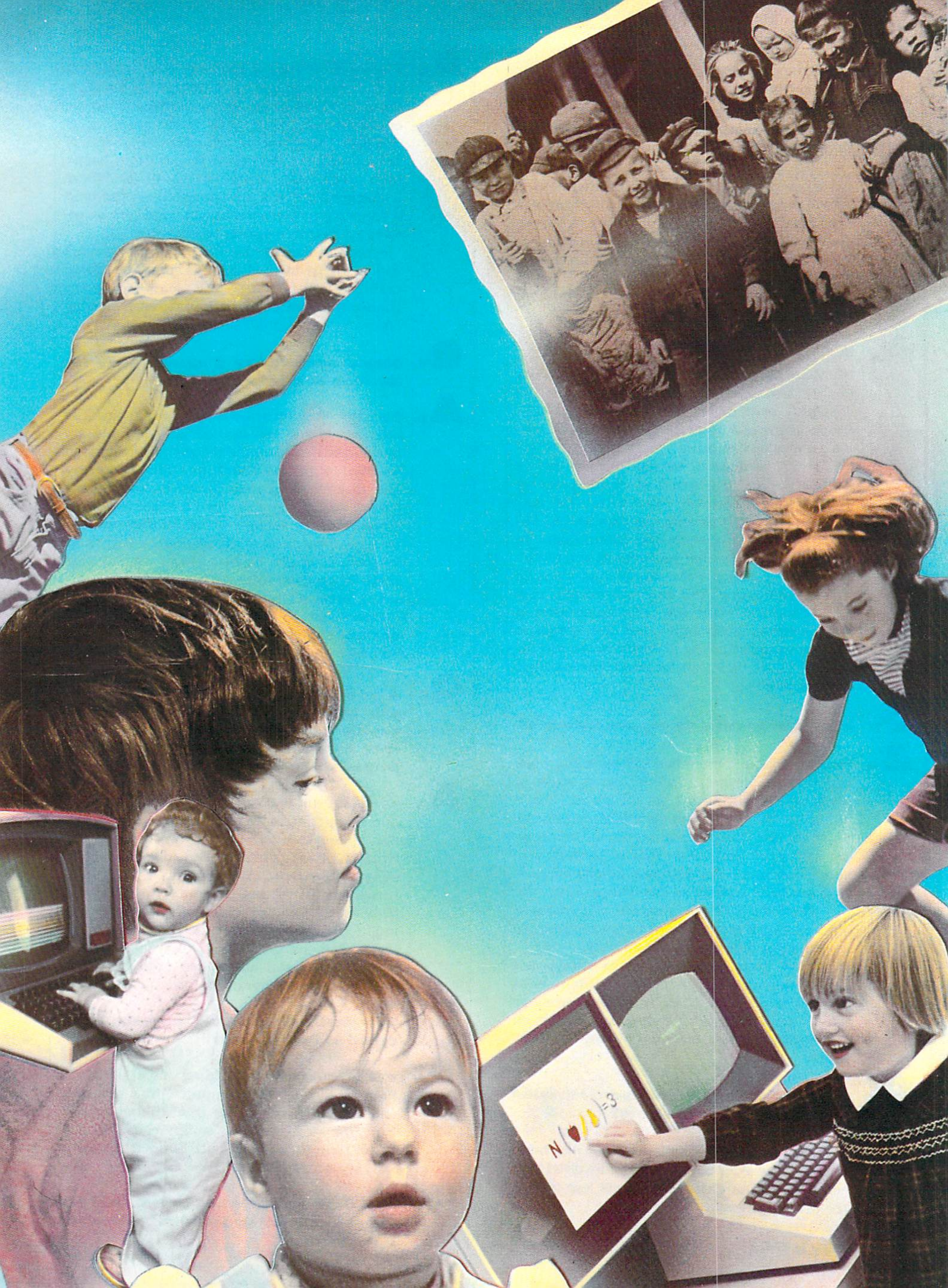
Q. **A lot of parents worry that the computer will keep their kids isolated from one another, particularly at a time when they should be developing social skills. Do you see that happening?**

A. No. Quite the opposite. I found that the computer *can* contribute to positive social interaction among kids as well as between adults and children. Young children can and do work in pairs, and parents can encourage them to take turns. An interesting program can serve as a go-between for two children who otherwise might not spend much time together, providing them a chance to get to know one another. And children and adults can explore various uses of the computer as colearners.

Q. **How much time should a young child spend at the computer?**

A. If a preschooler is spending more than one hour a day at the computer, you probably should ask, "What else is this child missing?" But time spent with the computer is probably better than the four or more hours a day many kids spend watching TV.

Q. **Isn't there a danger that parents will use the computer as some use television—as a babysitter?**



A. It's not possible—yet—because the software won't allow it. Most of today's software for young children requires adult supervision, which I think is great because it increases the interaction in families. But if parents think preschoolers now will go over in a corner and start using the computer, they are making a big mistake. However, as more software is developed and arcade-type games filter to the preschool level, that might be possible.

Q. What can parents expect from their three-year-olds? Four-year-olds?

A. While drawing is not of much interest to a two-year-old, by the age of three children begin doing representational art of houses, people, and animals. For three-year-olds drawing is fun and, I think, an important exercise on a computer.

At age four, children begin acquiring what are often called "school relevant" vocabulary words such as *up*, *down*, *above*, and *below*. Yet, nationally 30 percent of all children arrive at school without really understanding what such words mean. So parents can work with a four-year-old on such concepts.

It's important to remember that a computer can use the skills a child has, but it can't jump developmental stages. For example, it's ridiculous to think a computer will teach a two-year-old to spell. The problem now is that parents need more information about the sequence of child development so they can work with their child. In the future, publishers will probably have software that says, "If your child knows his or her letters, then the next step is to make the letters sound. Use Program 23." But that software doesn't exist right now.

Q. What will parents of young children be able to do five years from now? Ten?

A. They will have better software and more choices. They will be able to do things that now are impossible.

The system of the future will consist of a menu so that a three-year-old can go from a drawing program to counting to spelling according to his age level. The computer will ask parents questions about a child and from the answers select 10 to 15 programs all consistent with what the child needs. In the future we may come to the point where the computer says to a parent, "I have some suggestions for you. Have your child work on these five con

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THE CONCERNS: What Experts Say

What does the research say about microcomputers and young children? Very little. At least that was the consensus of opinion at a national conference last summer at Columbia University Teachers College. Two hundred parents, teachers, and computer experts raised such questions as "What is the impact of computers on preschoolers?" "What are the health hazards?" and "What are the psychological implications?" The conclusion? After days of seminars, participants agreed: Much more research in this area is needed before anyone has a clue.

"There's just not enough research yet to know what the effects [of preschool computing] will be," says Patricia A. Vardin, conference director. "But people are raising serious concerns."

Among them are parents who worry that their children will be socially and physically isolated from others when using the machines. At the same time, parents don't want their offspring left behind in the technological revolution. Teachers are concerned that too much of the software is inadequate for preschoolers and emphasizes drill-and-practice instead of more creative applications.

B.J. Barnes, a professor of education at California State University in Fullerton, believes parents should be extremely cautious. In an article in *The Computing Teacher*, she and coauthor Shirley Hill, director of California State's Microcomputer Center, expressed serious concerns that the use of the computer will be at the expense of more important aspects of a child's development.

"We believe that children must reach the state of concrete operations before they are ready to work with microcomputers," they wrote. "Experiences with a computer should never replace their experiences with real events and objects."

The two educators noted that where the real world is three-dimensional, the computer screen is merely two, just a representation. "Children need to play, to touch things, and to have hands-on experiences before they move on to the computer."

Meanwhile, throughout the country, nursery schools have begun purchasing micros for their young charges. For example, the Kindercare Learning Centers, a national child-care facility, has placed Commodore PET computers in 56 of its centers in Alabama, Texas, and Minnesota. The software stresses prereading and premath skills, colors, shapes, and concepts like "over" and "under."

Those young children who don't have access to computers in the home or classroom can sign up for summer computer camps for preschoolers at both the Universities of Maryland and Delaware.

As the debate about computers and young children continues, so does continuing research into which activities are best for preschoolers—and why. And child development specialists are learning one key thing: We are only just beginning to realize the capabilities of the young child's mind, and the computer may be the tool that will enable parents to reveal their child's true potential. —S.R.

ILLUSTRATION BY MARK TAUSS

Little Programs for Little Kids

BY W. PATRICK DICKSON

IT'S EASY TO GET YOUR PRESCHOOLER STARTED ON A COMPUTER.

Readers of FAMILY COMPUTING *interested in obtaining versions of all these programs designed for their particular home computer, can write us for free translations. If you own an Apple, Atari, Commodore 64 or VIC-20, IBM, TI-99/4A, Timex, or TRS-80, send us a self-addressed stamped envelope, indicating which translations you want. Also, write the name of your computer on the lower left-hand corner of the return envelope. Send your requests to Barbara Bevan, "Preschool Programs,"* FAMILY COMPUTING, *730 Broadway, New York, NY 10003.*

COMMODORE 64 AND VIC-20/ CHALKBOARD

This program allows children to type on the keyboard and immediately see the results on the screen, thereby increasing letter and number recognition. (The statement SYNTAX ERROR will not appear on the screen, even after you press the RETURN or ENTER key.) When you type in the program, substitute your child's name for ANDREW in line 20.

ATARI/NAME AND AGE

The program begins when you type in your child's name and age. If your child's name is Andrew and he is three years old, the sentence ANDREW IS 333 scrolls continuously in a random pattern across the screen, accompanied by a beep tone. The child's age is repeated as many times as the number input. Children love this program because it familiarizes them with their age and the letters in their name.

```
10 DIM N$(20),A$(2)
20 PRINT CHR$(125)
30 PRINT "NAME AND AGE GAME"
40 PRINT
50 PRINT "PRESS THE RETURN KEY"
60 PRINT "AFTER EACH REPLY."
70 PRINT
80 PRINT
90 PRINT "NAME OF CHILD:"
100 INPUT N$
110 PRINT "AGE OF CHILD:"
120 INPUT A
130 IF A<1 OR A>99 THEN 120
140 PRINT CHR$(125)
150 P=INT(30*RND(1))+1
160 R=INT(23*RND(1))+1
170 POSITION P,R
180 PRINT N$;" IS";
190 FOR I=1 TO A
200 PRINT " ";A;
210 FOR T=1 TO 75
220 NEXT T
230 NEXT I
240 GOTO 150
```

APPLE/NEXT LETTER

You may hear your child humming the alphabet song as he or she tries to play *Next Letter*. In this program, three sequential letters of the alphabet appear on the screen, and your child is asked to guess the next letter. If the answer is incorrect, the cursor simply remains in position. A correct answer is rewarded with a beep and the statement RIGHT!

```
10 HOME
20 PRINT "TYPE THE LETTER"
30 PRINT "THAT COMES NEXT."
40 PRINT
50 PRINT
60 N = INT(23 * RND(1)) + 65
70 FOR I = N TO N + 2
80 PRINT CHR$(I);
90 NEXT I
100 GET G$
110 IF G$ <> CHR$(I) THEN 100
120 PRINT G$
130 PRINT
140 PRINT
150 PRINT "** RIGHT **"
160 PRINT "PRESS ANY KEY TO PLAY AGAIN."
170 GET K$
180 GOTO 10
```

TIMEX SINCLAIR 1000/GUESS A NUMBER

Guess a Number draws attention to the number keys on a computer, while introducing the idea of a number line. Your child is first asked to choose one of the numbers appearing on a line on the screen. A "greater than" or "less than" sign then appears under that number, cluing your child to the direction of the correct answer. These clues continue until the right number is selected.

```
10 CLS
20 PRINT "GUESS A NUMBER FROM 1 TO 9."
30 PRINT
40 PRINT
50 L$ = "1 2 3 4 5 6 7 8 9"
60 PRINT L$
70 N = INT(RND(9))
80 G$ = INKEY$
90 G = VAL(G$)
100 IF G < 1 OR G > 9 THEN 80
110 IF N = G THEN 150
120 IF N > G THEN PRINT@ 2*G+126, ">";
130 IF N < G THEN PRINT@ 2*G+126, "<";
140 GOTO 80
150 PRINT@ 2*G+126, "*";
160 PRINT@ 224, "* RIGHT *"
170 PRINT "PRESS ANY KEY TO PLAY AGAIN."
180 K$ = INKEY$
190 IF K$ = "" THEN 180
200 GOTO 10
```

Young children can learn a lot from using a microcomputer, even without the benefit of commercial software. The four programs of the opposite page can be entered into the computer in minutes by a parent or older sibling. Each is designed for a computer brand frequently bought for home use. *[To find out how to get versions of all these programs for your computer, see previous page.]*

These programs demonstrate how simple it is to get your child started on a computer, learning the fun way. More involved programs, using the unique graphics capabilities of your own microcomputer, can easily be written.

Some parents have found that creating programs for their children can lead to an interest in programming. In fact, some of the best software for children has been written by parents. If you have written simple programs for young children, we'd like to share some of them with our readers in a future issue.

Send a disk or tape containing two copies of your program, plus a listing (preferably a printout) to: The Programmer, FAMILY COMPUTING, 730 Broadway, New York, NY 10003. Include your name, address, phone number, computer model, the program title with a brief description, including how you developed and use it, and the memory and level of BASIC required. We will pay $50 for those we publish. If you want your disk or tape returned, enclose a stamped, self-addressed mailer. FAMILY COMPUTING cannot assume responsibility for the loss or damage of any unsolicited materials. FC

HOW TO USE A MICROCOMPUTER WITH YOUR PRESCHOOLER

Parents need to be especially careful when their young children work with a computer. In some ways it's pretty much like introducing them to anything new: It's important that preschoolers are helped to develop careful habits and understanding right from the start. However small or inexpensive your home computer, it is still a sophisticated piece of machinery that should not be tampered with by little fingers. The following tips are gathered from those who have had experience working with preschoolers and computers.

1. Begin slowly. Don't pressure children to do more than they can—don't attempt too much too soon.

2. Select hardware and software that is appropriate for young children. Unlike their older brothers and sisters, preschoolers cannot compensate for a bad program.

3. Use the time at the computer as an opportunity to talk with your child, ask questions, and share ideas.

4. Before purchasing a home computer, check with your child's school. There may be teachers or administrators who can offer advice about what to purchase. And some schools may be able to help you get a discount or a service arrangement.

5. Contact your local user groups, computer store sales representatives, preschool teachers, and play groups to find others who are using computers with young children so you can swap information.

6. Post large envelopes near your computer to store the individual disks or cassettes. Paste pictures and symbols on the outside of the envelopes so children can recognize a program and select their own.

7. If you are concerned about health risks, note the following recommendations. *The New England Journal of Medicine* suggests that young people who spend two or more hours a day using color TV sets manufactured before 1970 could be exposed to unsafe doses of radiation. Solution: Use newer sets and for shorter periods of time.

Also, the National Institute for Occupational Safety and Health recommends a 15-minute break after one hour of continuous use of a video display terminal.

8. Parents also need to protect their young children (and the computer) from the dangers of using a sophisticated machine. (Some parents do not allow their children to load the disk drive because of the cost of the equipment.) So, be sure little hands do not probe in places where they don't belong. Wires should be taped to the floor in a place where they will not cause a child to trip, or where a child will not be tempted to play. Children should also be taught not to bang on the keyboard or the screen, and to hold the disks properly. You'll eliminate hazards *and* frustration if you teach children to practice safety first.

9. Some children may need extra practice in learning how to press the keys down one at a time—and just for a brief moment. One preschool teacher using computers in the classroom introduces her students to electric typewriters first, so that they learn to punch one key at a time. She also uses a robot to introduce children to simple commands. Other children may benefit from special accessories such as light pens or joysticks.

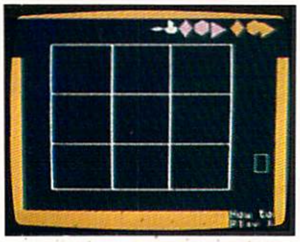
10. The furniture used in the computer work area must fit your child. Be sure the chair a child uses is the appropriate height, and, if necessary, adjust the computer so that it is low enough for a child to reach. —S.R.

Do you have a tip on working with young children that you'd like to share with other parents? Send a description of your idea to Barbara Bevan, FAMILY COMPUTING, 730 Broadway, New York, NY 10003. We cannot acknowledge receipt but we will make every effort to include your idea in a future issue.

Software for Preschoolers

BY W. PATRICK DICKSON AND KARIN BORGH

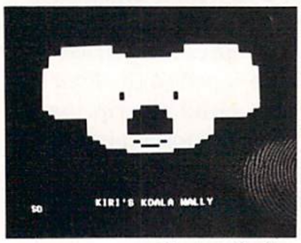
Two years ago, Pat Dickson and Karin Borgh began to search for good software for preschool children. Pat was interested in software for his own preschoolers to use at home and in software for use in the University of Wisconsin's Laboratory Preschool. He teamed up with Karin, a preschool teacher in Madison, and they began looking at all the programs they could find for young children. By last year, Karin had become so interested in the project that she returned to graduate school and ran a year-long study using the microcomputer in the Laboratory Preschool. They selected the software described below after examining more than 40 programs marketed for preschoolers.



Gertrude's Secrets

During the past two years we have looked at lots of software for preschool children. We're also parents, so we understand the difficulty of knowing what to buy for children. One of the most important things we've learned is that parents must get beyond first impressions. The value of a program cannot be judged by the packaging or a quick glance at the screen.

For example, the recently released *Stickybear ABC* comes in a colorful package complete with a children's book, stickers, and a binder. And the high-resolution graphics are quite eye-catching. But when you watch children use this software for a few minutes, you soon discover that they become bored with it quickly, and for good reason. The program is slow-paced, the child has no control over the action on the screen, and, from an educational standpoint, the animation is poorly used to draw the child's attention to letters.



Hodge Podge

Another problem is that you cannot count on consistency from programs marketed by the same company. Although Learning Company has produced some outstanding software, (such as *Gertrude's Secrets*, which we recommend below), its *Juggle's Rainbow* and *Bumble Games* are not worth the price. And beware of excessive claims: One program passes itself off as an "IQ builder" but only teaches kids "same" and "different" and letter recognition.

So parents need to look carefully at software, read reviews, and, wherever possible, try to watch their children using the software before buying it. Some stores now allow you to return software for a refund after a one- or two-day trial period.

As you build a software collection for your preschooler, try to focus on what you want your child to learn. Get a variety of programs to see what kinds of things your child likes to do with the computer. In this review we've tried to identify the "best buys" in several different areas that appeal to preschoolers: exploring the keyboard; letters, numbers, and counting; drawing; writing; and problem solving. But remember that no one knows your child better than you. You are the final judge of what software is best for your family.

EXPLORING THE KEYBOARD

By far the best beginning program to buy for your young child is **Hodge Podge**. It's fun, colorful, and musical, and a child can't go wrong. Any key you press does something! When you press "F" a farm appears, a few bars of "Old MacDonald Had a Farm" play, and a farm animal appears. Press "F" again, and the cycle is repeated with a different animal. Press "V" and a volcano erupts, or "Z" for colorful zigzags across the screen. The number keys make musical notes. Kids talk to themselves, to others, and to the computer when using *Hodge Podge*. They are free to explore an entire keyboard of possibilities at their own pace without adult help. In addition, parents and kids enjoy sharing *Hodge Podge*. No other disk offers so much at such a reasonable price.

Hodge Podge *by Dynacomp is available for the Apple II/IIe and Atari 400/800; cassette $14.95, disk $18.95. A version without sound,* Hodge Podge II, *is available for the TRS-80, 48K (disk), 32K (cassette).*

LETTERS, NUMBERS, AND COUNTING

The best program we know of for teaching letters and numbers is **Alphabet Beasts & Co.** Inferior programs simply draw a picture associated with the letter or have the child match a letter on the screen to one on the keyboard. This program uses high-resolution graphics to draw the child's attention to the shape of the letter or number in the form that the child would write by hand. A cast of characters, including dragons, fairies, and unicorns, illustrate each letter, accompanied by a short rhyme.

Alphabet Beasts & Co. *by Software Productions is available for the Apple II/II plus/IIe; disk $29.95.*

Among the counting programs we have studied, **Counting Bee** (soon to be renamed *Introduction to Counting*) is first-rate. In the

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easiest counting task, fast, colorful balls roll down a hill, bounce through the air, and form a stack. The child counts the balls and presses the corresponding number key. One of the strongest features of *Counting Bee* is the way in which tasks nicely extend counting to other activities. For example, in one activity colorful liquid flows from a faucet and fills a cylinder marked off in units, which the child counts. This introduces counting as a way of measuring—an educationally sound approach.

Other lessons include addition, subtraction, putting sticks of different lengths in order from shortest to longest, and balancing weights on a scale. All of these tasks are presented in a way that preschool children can understand and use.

The menu permits the parent to choose which tasks to have the child do and in what order. Unfortunately, the menu is unnecessarily awkward, so a parent must start the program, but thereafter the child can work alone if he or she can count to nine and recognize the keys for those numbers.

Counting Bee *by EduWare is available for the Apple II/II plus/IIe and Franklin Ace: disk $29.95; Atari 800 version, $39.95, is expected soon.*

Early Games is an excellent comprehensive package for preschoolers. It includes letter-, number-, and shape-recognition activities; very simple counting tasks; and a "friendly" menu. Pictures associated with each activity appear one after another on the screen. When children see the picture that reminds them of the game they want, they just press any key and that activity begins. When they want another game, they press the ESCAPE key to return to the menu.

The drawing program on *Early Games* is also well designed. Very young children can draw by simply pressing any key. Keys at the top of the keyboard make the drawing cursor go up, keys at the bottom make it go down, and the ones on the corners draw diagonals. Pressing the space bar changes the color of the line. In this manner, children draw and learn about the keyboard while drawing, and their accomplishments can be saved on a disk.

Early Games does not cover counting or letter recognition in the same depth as the programs described above, but it includes a broader range of topics. A favorite among preschoolers we've watched, it is also an excellent program for adults and preschoolers to use together.

Early Games *by Counterpoint Software Inc. is available for the Apple II/II plus/IIe, 48K (disk); Atari 400/800, 24K (disk), 16K (cassette); IBM PC, 64K (disk); TRS-80 I/III/Color Computer, 32K (disk), 16K (cassette); VIC-20 (cassette); Commodore 64 (disk, cassette). All disks and cassettes cost $29.95. Software similar to* Early Games, *available for the TI-99/4A, is called* Early Learning Fun *from Texas Instruments, cartridge $29.95.*

DRAWING

Kids love to paint, and the computer is a powerful tool for designing pictures. Some drawing programs for microcomputers even "feel" like finger painting. Others resemble coloring in a coloring book, while still others involve programming. We recommend **Paint** because it is most like painting with a brush. But what a brush! A child can choose from nine "brushes" in nine different widths and dip the brush into any one of 10 "pots" of color on the screen. This program, developed at the Capitol Children's Museum in Washington, D.C., makes full use of the Atari's powerful graphics.

Paint *by Reston Software is available for the Atari 800 (disk), $39.95.*

Closely related to painting programs are those that use graphics to introduce the concepts underlying programming. The programming language LOGO first developed this approach, but many programs are becoming available that use the basic concept. Perhaps the best for young children is **Delta Drawing**. This program is simpler than LOGO to use and allows children to draw pictures, color them in, name them, and, with a single key press, see the turtle draw the pictures again.

Delta Drawing *by Spinnaker is available for the Apple II/II plus/IIe and IBM PC: disk $44.95.*

Alphabet Beasts & Co.

WRITING

Young children can begin to enjoy writing with the computer if a parent is willing to spend some time with them. Four-year-old Andrew Dickson began writing by dictating stories to his father to type on the computer. Recently he has begun using the **Bank Street Writer**, a simple-to-operate word-processing program, on his own. His spelling is unique and "his" stories ramble, but he can turn on the computer, write and edit a "story," transfer it to a disk, and retrieve it later. There are many word-processing programs available, of course, but the *Bank Street Writer* is specifically designed to put word processing in the hands of young children.

Bank Street Writer *by Broderbund Software is available for the Apple II/II plus/IIe and Atari 400/800/XL series; disk $69.95. It will soon be available for the Commodore 64. School copies with backup disks and complete teaching and learning manuals, distributed by Scholastic Inc., $95.*

Delta Drawing

Paint

PROBLEM SOLVING

Gertrude's Secrets is designed to teach problem-solving skills to older preschoolers. Gertrude is a goose who acts as a guide through three different puzzles, shown in three different rooms. A child can use either the keyboard or a joystick to move from room to room. In the first room the child must arrange shapes by color and form. In another room shapes must be placed into sets that are alike in some way. For example, one group may contain all

triangles, while another may contain all red objects. And, the child must place the red triangle in the spot where the two groups overlap. Each of the puzzles has two levels of difficulty. Although this type of classification activity is challenging for young children, they enjoy it. When a child solves a puzzle, Gertrude rewards the effort with a special graphics display, and sometimes with music. Children may select new shapes for use in any of the tasks or create completely new ones with the Shape Editor.

Gertrude's Secrets has many nice features. The fantasy of a helpful goose and the sense of moving through rooms makes children feel comfortable. The computer's response to errors is gentle: the shape simply "falls" back out if it is not placed correctly. Kids are thus encouraged to rethink their moves, and to try out different locations or shapes. They set their own pace and make their own choices. Plus, the graphics are excellent. The disk is somewhat overpriced, but it is one of the few available designed to teach problem-solving skills to young children.

Gertrude's Secrets *by The Learning Company is available for the Apple II/II plus/IIe; 48K (disk), $44.95. Color TV or monitor required.* FC

CHOOSING EDUCATIONAL SOFTWARE FOR PRESCHOOLERS

As parents, we are constantly confronted with decisions. Which breakfast cereal is best for our children? Which television programs should they be encouraged to watch? And now the popularity of the home computer has created a whole new world of choices—and important decisions. Because so many of us have brought a computer into the home (or intend to) as a tool to supplement our children's education, we must now choose from the software packages that claim to help our children master the alphabet, learn about numbers, and reinforce existing skills.

Assessing software presents special kinds of problems. It is, for example, totally different from choosing a toy, whose value can often be judged at first glance. And because relatively few companies have developed software for preschoolers, there is not much to choose from.

Although some older children are capable of choosing their own software, preschoolers are not. What are the criteria to consider when evaluating software for our children? The following guidelines are intended to offer some standards for effective decision making in this area.

Educational Value. You cannot shop for software without doing some homework. Look for what the program *does*. Study how it works. How does it attempt to teach or reinforce an existing or particular skill? Is this a skill your child needs to strengthen or develop?

Does your child, for example, recognize basic shapes or do you feel it necessary to reinforce this concept? Perhaps your child is starting to draw and you want to supplement this with some form of computer interaction. Try to determine those areas in which your child might benefit from computer-aided instruction, and think about them when you come across new software.

When considering the computer as a teaching aid, however, it is important to remember that this wonderful new technology is only a tool, one of many available for working with preschoolers. When evaluating any piece of software as a learning tool, parents must ask: Is the use of the computer an improvement over traditional ways of learning the same thing?

Graphics. The best educational tools make learning an enjoyable experience. Gone are the days of boring flashcards that do nothing more than drill and repeat. A good piece of educational software often uses a game format; it should be stimulating, dynamic, and fun to play. When evaluating a computer game, pay careful attention to the graphics (the way the game is animated). Are they attractive and appealing?—not necessarily to the buyer, but to the user. Will they hold your child's attention without being distracting? Most important, are the graphics used to draw the child's attention to the educationally important aspects of the display? Be cautious of graphics that seem too "busy" or sophisticated. A preschooler needs simplicity and becomes easily confused when bombarded with too much detail.

Age. A program should match your child's age and interests. One that is overly simplified will quickly be discarded. On the other hand, software that is too advanced can become a source of frustration.

Program Features. When possible, try to get a demonstration of the program so you can study its format. Are the directions simple and clear, allowing easy interaction between computer and child? Does the program provide positive reinforcement for correct responses? Some programs even provide a "reward" upon completion, such as a musical salute, enhancing a child's feelings of success. Note the manner in which incorrect answers are handled. Is there a loud, nasty noise, a hint or demonstration of the current answer, or no response at all?

Creativity. Try to vary your selection of software. In addition to programs that require only one correct answer, there are many others that offer more opportunity for creativity. Software varies in terms of the control and the choices children have; the more, often the better.

Used with discretion, educational software is a beneficial teaching aid with many exciting possibilities. But the computer is only an aid; it is not a teacher and can never replace valuable "hands-on" and interpersonal activities. It cannot give your child a sense of the texture of sand or the cool, slippery feeling of water. It cannot provide the nurturing effect of a parent reading a bedtime story. As parents realize, the development of a well-rounded child requires a wide variety of experiences. The computer offers only one, and it is essential that we keep it in proper perspective when considering its use with a young child.

—PAM HOROWITZ

PAM HOROWITZ *was the director of a preschool program in Oak Park, Michigan, and taught kindergarten in both Detroit and Fullerton, California. She now lives in Connecticut, where she does private tutoring and uses the computer as an aid with all of her students.*

B A S I C B O O T H

"Howard is suffering from buyer's remorse. Not because of the new computer. Because of the large sausage pizza pie with everything, plus free cola."

Castles, Cathedrals, and Computers

THE STORY OF A MOTHER-AND-DAUGHTER TEAM THAT ORGANIZED AND WROTE A FAMILY HISTORY BOOK ON A COMPUTER.

BY KAREN KLASSEN

Authors Karen Klassen (left) and Carol Gavle

An ancestral castle (as of 1347) in Jutland, Denmark

Mule coat of arms (unidentified)

July is hot and humid in the Midwest. So hot you can hear the corn grow when the temperature and humidity approach the century mark. When that happens, most people seek the shelter of air-conditioned homes and the solace of a tall glass of lemonade. But on just such a hot and sticky summer Sunday this past July more than 100 people—ranging in age from one week to well over 80—gathered one mile south of the Minnesota-Iowa border for a family reunion. While the children played games in a nearby cornfield, the other members of this Norwegian-American family remained inside the 125-year-old Silver Lake Lutheran Church to share old memories. And what memories!

A copy of the recently published family history book, *Castles and Cathedrals: The Fraas, Sorenson Lah Family History from 1062*, was available. All descendants of the Sorenson Lah family, whose ancestors left Norway in 1854 to settle and farm the rich agricultural land of Minnesota, now have a record of their roots dating back to the year 1062.

MONEY-SAVER; MONEY-MAKER

My mother, Carole Gavle, and I wrote, edited, and "typeset" the 230-page book on an Apple IIe computer. The computer saved us time and money, and made for a more complete and interesting book. While many family histories contain only lists of names and dates, this one is filled with stories about ancestors.

At every step of the way, using the computer was like having an unpaid assistant. We organized our copious notes, written in loose-leaf notebooks, on computer files with a word-processing program. We edited and added to the files as new information surfaced. We checked for misspellings with a program called *Sensible Speller*, so we didn't need a proofreader. We used a letter-quality printer to print out the text, eliminating the need for format typesetting. When we finally brought the manuscript to the publisher, all he had to do was lay out the pages and have them printed. He said it was the "cleanest" family history book he had ever published. And I'm not a very good typist.

The enterprise, which started with a letter to a Norwegian archive, was so successful that we're already starting another one—this time a book on my father's genealogy. Once you get going on a family tree, it gets into your blood, and it's impossible to stop. It's like doing a giant jigsaw puzzle—you keep searching for the next piece of the puzzle.

And now that we know just how to use the computer, the whole process will be easier. We've also discovered a new program, *Roots/M*, which is designed to help genealogists organize family data. *[See listing of genealogical programs, on page 72.]* When we started, we had no idea this kind of specialized data-base program was available.

HISTORY AND TECHNOLOGY

At the reunion, my two sons sat behind a table in one corner of the church selling copies

KAREN KLASSEN *lives with her husband and three children in Northfield, Minnesota. She is a schoolteacher and coauthor (with Carol Gavle) of the book,* Castles and Cathedrals.

Dr. Ole Worm (fourth from left, back row) and family. Worm (1588–1654) was personal physician to King Christian IV of Denmark.

Dr. Niels Randulph (1665–1711), a bishop in Norway for 45 years

The original family homestead in Minnesota

Some Sorenson ladies showing off their hats in 1908

of the book. They sold about 100 copies at $25 each. (Selling another 25 copies will cover all publishing costs.) On a nearby table was an Apple IIe computer, to show people how the family tree and book were actually prepared.

This blend of centuries of history and the latest technology seemed strange to some of those gathered. While some of the younger relatives wrote programs in BASIC, the older ones commented that the Apple made a funny looking typewriter.

But they learned about a number of interesting and important ancestors as they examined the hardback book. Some were kings, some were knights, while still others were important government and church leaders, including a bishop. One of the more colorful was Niels Bugge, who served in Denmark's parliament in 1302. Bugge, a knight at Hald Castle, was the richest man in Denmark. King Valdemar, jealous of his power, tried to storm the castle and failed. Niels and King Valdemar eventually established a truce, but when they met again in 1358, Niels and two other knights were ambushed and killed by the king and his men.

Another highlight of our past occurred right after the family arrived in America. When the Civil War broke out and President Lincoln asked for volunteers, the boys from this family volunteered immediately. They wanted to prove that they belonged in America and to express their loyalty to President Lincoln and their new homeland. They were also against slavery. Two of the boys, Soren and Jens, enlisted in Iowa and served in the entire conflict, fighting in some of the biggest battles of the war, including Pleasant Hill and Vicksburg.

RESEARCHING THE FAMILY TREE

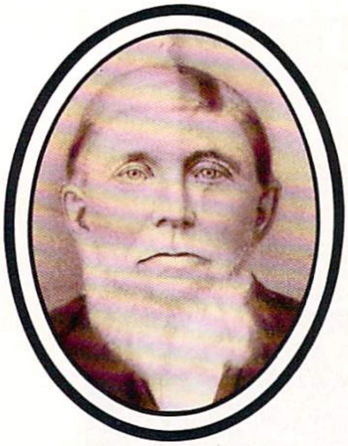
The groundwork for our research was done in Norway. My mother and I traveled there in 1978, and spent two weeks collecting information from archives. Coming home, we made many trips to the nearby St. Olaf College library, which has a good collection of books about Norwegian history. My mother also contacted many relatives still living around the original Minnesota homestead. With these rich sources, and my mother's ability to translate Norwegian into English, we began to amass information.

We recorded all our notes in spiral notebooks. We also filled cardboard boxes with pictures, copies of old books, official documents, and letters from archives, court houses, and newspapers. We began organizing the data in family tree charts, giving each of the 137 ancestors we'd found a number. Then we started to write the book.

Bugge coat of arms (14th century)

COMPUTER TO THE RESCUE

At this point, I hardly knew what a word-processing program was. But we had a computer at home, which my husband, Dan, was using for his business. And, after calculating the cost of having a typist and editor do the book for us, I began to experiment with a pro-



Soren and Jensina Sorenson Lah, the forebears who arrived in America in 1854

A double wedding in 1891

The Jens Lah family; second generation in America

Fourth of July in Emmons, Minnesota, 1915

Kruckow coat of arms (15th century)

COMPUTE YOUR ROOTS

Genealogical programs are specially tailored database programs. They allow you to store information (such as date of birth and death, spouse, children, sex, place of residence, etc.) on hundreds of people and then manipulate this data in a variety of ways.

You can call up a "family group sheet," which displays a list of one individual's immediate family. You can call up a "pedigree chart," or family tree, tracing your ancestors back in time. You can determine the relationship between any two individuals related by blood. You can display the anniversaries—of births, marriages, deaths—that have occurred on any one day or for the whole year.

Not all genealogical programs can do all of these things. In the following listing, all programs designed to produce family group sheets are marked by an F. All those designed to produce pedigree charts are marked with a P. *Genealogical Computing*, the newsletter that compiled this list of programs based on reports of usage by readers, recommends that manuals and samples (or "demos") be bought before a major expenditure is made. In most cases, samples are available for a nominal mailing fee.

Ancestry I/III (F,P); Soft-Gene; 11 John Swift Rd., Acton, MA 01720; TRS-80 Models I/III; $69.95 (plus $2 shipping). **Family for CoCo (F,P);** TWM; P.O. Box 232, Lititz, PA 17543; TRS-80 Color Computer; $9.95. **Family Roots (F,P);** Quinsept, Inc.; P.O. Box 216, Lexington, MA 02173; (617) 862-0404; IBM PC, Apple II/IIe; $185 (plus $3.50 postage). **Genealogy: Compiling Roots and Branches (F,P);** Armstrong Genealogical Systems; 5009 Utah St., Greenville, TX 75401; (214) 454-8209; TRS-80 Models II/12/16; $250 ($2 for instructional booklet). **Genealogy Program (F);** Frank Lerchen; 2950 Espana Court, Fairfax, VA 22031; TRS-80 Model III; $48. **Genie (F,P);** Central Research of Utah; 60 S. 500 W., Bountiful, UT 84010; (801) 298-7713; Apple II plus/IIe/III, Commodore CBM, IBM PC, Kaypro II, Osborne I, TRS-80 Models I/II/III/12/16; $195-$497 (various modules available). **Generations (P);** Micro-80, Inc.; 2665 N. Busby Grove; Oak Harbor, WA 98277; (800) 528-6050 ext. 3005; TRS-80 Model I/III (disk or cassette); $26.95 (plus $2 shipping). **Family Group Sheet Program (F);** John A. Ashworth, Jr.; P.O. Box 809, Matthews, NC 28105; (704) 847-2058; TRS-80 Color Computer (disk or cassette); $47.50. **Gensystems (F,P);** Armstrong Genealogical Systems; address above; TRS-80 Models I/III/IV; $128.45 ($2 for instructional booklet). **Genesis-80 (F);** Anthony J. Skvarek; 1514 W. Mission #14, Pomona, CA 91766; TRS-80 Model III; $139 ($2 for sample information). **Roots/M (F,P);** Commsoft, Inc.; 665 Maybell Ave.; Palo Alto, CA 94306; (415) 493-2184; Apple II/II plus/IIe (CP/M required), Northstar, Osborne, TRS-80 Model II, Zenith/Heath; $195 ($7.50 for demo program). **The Genealogist's Right Hand (F,P);** User Friendly Systems, Inc.; 6135 Ross Rd., Fairfield, OH 45014; (513) 874-4550; Apple II/II plus/IIe; $99.95. **Treesearch (F,P);** Array Systems; P.O. Box 295, Brigham City, UT 84302; Epson HX-20, IBM PC; $200. **Your Family Tree (F);** Acorn Software Products, Inc.; 1945 Gallows Rd. #705, Vienna, VA 22180; TRS-80 Models I/III (cassette or disk); $29.95.

SOURCE: *Genealogical Computing*

The family reunion last July in Iowa. Over 100 people, ranging in age from one week to over 80 years old, attended.

gram called *Apple Writer II*. As my rusty typing skills improved, so did my knowledge of the commands needed to write, edit, and save files on a disk.

I also made a lot of mistakes. I remember hearing the buzz a computer makes when you do something wrong. I'd jump up thinking the whole disk had been erased. Sometimes, I'd type for hours and then forget to save the file on a disk. I'd also make my files too long, so that I had trouble loading them back into the computer. I started making shorter files—and backup copies of all the work I did.

The computer helped me organize the information into logical units. Since I was storing information in separate files, I developed an organizational scheme that eventually served to structure the book. While the word-processing program itself did not impose this scheme, I'm convinced that the ease of saving and switching files with the program made *me* more organized and logical.

MASTERING THE PRINTER

I began to experiment with printing the text files I had created. This was a crucial part of the process, because we weren't going to have the book typeset; rather, it would be printed directly from the material we gave to the printer. Again, as with the computer, the manual for our Diablo 620 printer was my only instructor. After learning how to print out a simple text file, I learned to use the *Apple Writer II* commands that control the printer and format the text.

The Diablo 620 is a daisy-wheel printer that produces high-quality printouts. In addition, I could change the daisy-wheel printhead to use a variety of type styles. And I could create different margins, line spacing, and line lengths, and print justified text. Using a typewriter, I never could have gotten the right-hand margins to come out even.

A PROOFREADING PROGRAM

When I was ready to begin the final printing, I passed the dozen or so disks with text files through a "spelling checker." This program, *Sensible Speller*, took the place of a proofreader. I could check all my files against a dictionary of about 90,000 words—and the program listed all the misspelled words. Of course, the many family names and Norwegian words in the book were not contained in the dictionary.

Last May, five years after my mother and I had started research, we finally delivered the manuscript to the publisher. He said he had never seen such a well-organized manuscript. Our experience shows that the computer can be used to good advantage by someone who has had no previous experience with one. It also demonstrates the value of the computer as a storage device, and as a tool for organizing, updating, and correcting text. After all, 921 years is a lot of history to cover. FC

Barsebek coat of arms (14th century)

PHOTOGRAPH BY PHIL KLEIN

How People and Machines Can Work in Harmony

PART ONE OF A REPORT ON ERGONOMICS

BY JANE WOLLMAN

JANE WOLLMAN, a New York-based freelance writer, contributes regularly to The New York Times, Technology Illustrated, Esquire, *and* Working Woman. *She is working on a computer programming book for children to be published next year.*

Thirteen-year-old Chester Johnson loves working with the computer that rests on a card table near the window of his room in Clearwater, Florida. But the computer's video display screen stands too low and far away for him, and Chester's eyes often feel strained viewing it. Sometimes the muscle tension—in his eyes, neck, and shoulders—even brings on annoying headaches. So, the teenager has adapted to the situation. First, he slouches down in his chair. Then he puts his right foot on the right edge of the computer. Next he puts his left foot on the left edge of the computer. Finally, Chester reaches his hands to the keyboard, and when he looks at the screen—strange as it seems—no more muscle aches!

Although the eighth-grader has engineered what to him is an amenable way of interfacing human with machine, there are easier—and better—ways to do the trick. In fact, a science known as computer ergonomics is devoted to making people feel physically comfortable and stress-free while seated at a micro. Instead of adapting user to computer, as Chester has done, however, ergonomics seeks to adapt equipment and work area to the *person.*

Two of the most common discomforts associated with computing are eye strain, caused by long periods spent staring at a video screen, and irritation from noise generated by some printers. You can easily eliminate both problems by creating your own ergonomically designed computer center. All you need are the proper devices and an interest in following some basic guidelines. *[Next month, in Part Two of* FAMILY COMPUTING*'s report on ergonomics, we examine how to put together a proper computer workstation, including finding the best design and placement for desks, chairs, printers, keyboards, and accessories.]*

GLARE

One of the major obstacles to comfortable computing is on-screen glare, created by surrounding lamps and light coming through windows. Glare makes the computer characters difficult to see and can produce visual difficulties and body aches as you strain to read the display.

To minimize glare that can occur when room light is too bright—which can also result in a "washed-out" image on the screen—never place the computer display facing a window. Likewise, don't face toward the window as you sit at the machine. Other antiglare strategies include painting the wall behind you a dark shade, such as navy or brown, and the wall behind the display a reflective shade, like beige.

Instead of hanging curtains or shades on windows, merely inhibiting light, use horizontal—not vertical—venetian blinds. The slats will "direct [sunshine] to the ceiling, making light fall on your work in a pleasing way as well as blocking the entrance of harsh side light," notes James Nuckolls, a lighting designer for Incorporated Consultants, Ltd., a Manhattan firm that advises people on the best ways to design work areas for either the home or the office.

Another way to avoid eyestrain is to use a video monitor with a low-glare screen. Varied approaches have been taken to reduce glare by diffusing reflection. Apple Computer's new 12-inch monochrome Monitor II ($229), for instance, has an etched screen, while Amdek Corp. puts a fine mesh overlay on the screen of its Color I-Plus 13-inch monitor ($399).

To achieve similar results with TV sets, you can buy special antiglare filters that attach to the screen. One of the more effective plastic shields is the CP-70 (about $135) made by Polaroid. A more economical alternative is a nylon mesh filter, such as the one sold by Radio Shack for $16.95.

Another method of decreasing glare is to tilt the screen so that a minimum of light is reflected on it. Some displays, such as the Apple unit mentioned above, have built-in "tiltability." But you can improve almost any display by buying a special platform for it. Such turntables typically let you swivel the TV or monitor from side to side as well as up and down.

For a swiveling screen requiring a minimal investment, you can even use a rubberized lazy Susan–type apparatus designed for reaching small objects in bathroom or kitchen cabinets.

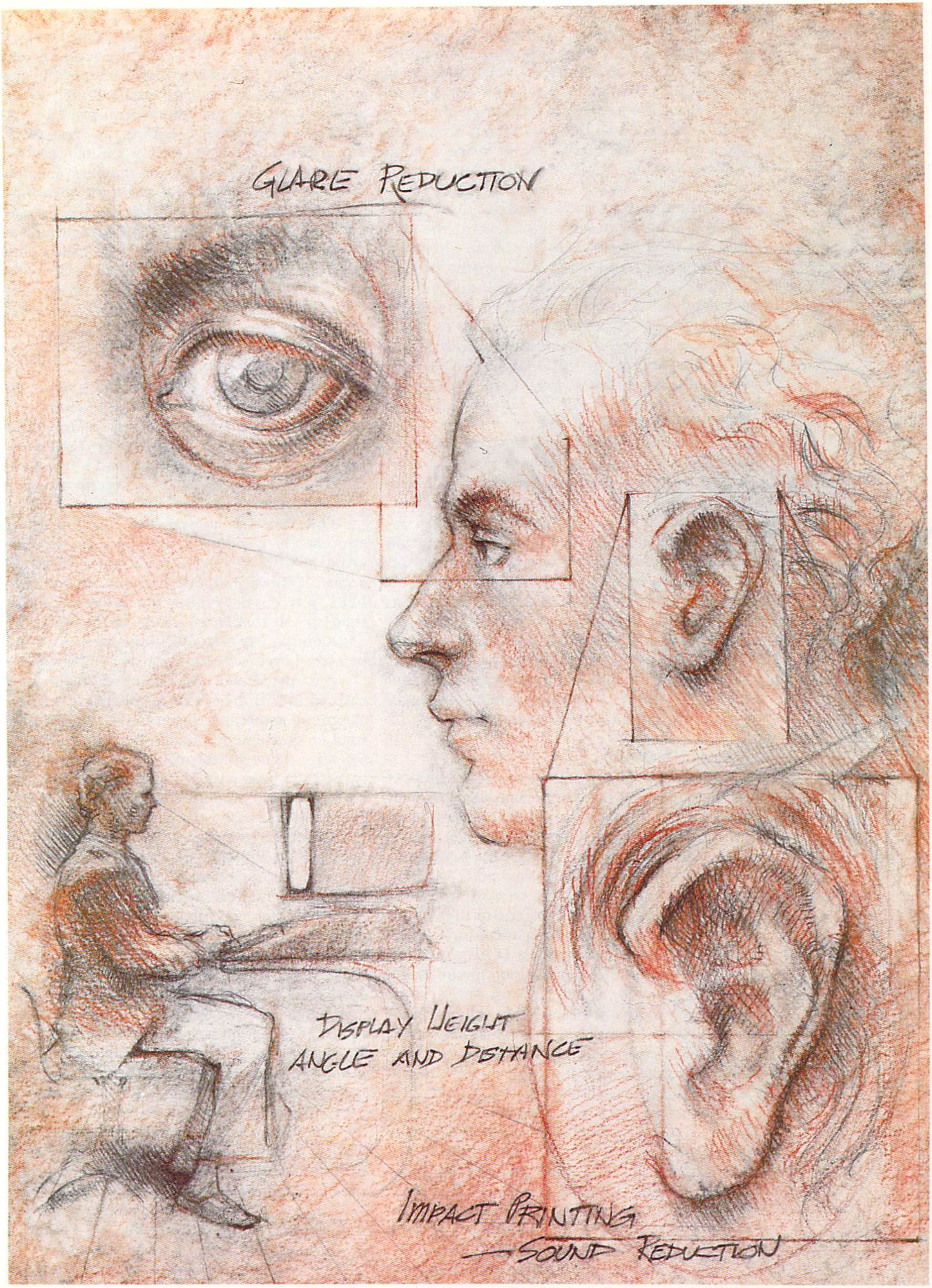


ILLUSTRATION BY CARTER GOODRICH

LIGHTING THE WORKSPACE

Computer users must not only design their workspace to take best advantage of natural light, but must also make certain that the area around their desks is properly lit. For best results, use a low level of surrounding light and a high level of "task" lighting, which shines directly on the work area. Never place a lamp behind you, as its light will reflect off the screen directly into your eyes. Experts recommend dimmer-controlled recessed ceiling lights or floor lamps that cast light toward the ceiling. An ideal "task" light is the architectural arm lamp, priced from about $20, which clamps onto the side of the desk and can be easily adjusted to the right angle. One model that provides extra flexibility, made by Luxo Lamp Corp., uses an incandescent bulb within a circular fluorescent tube (about $100). One or both lights can be switched on.

SCREEN HEIGHT

Experts agree that the most comfortable video display height is really a matter of personal preference. But according to Dr. Michael Smith, chief of the motivation and stress research section at the National Institute for Occupational Safety & Health (NIOSH), you will probably feel less muscle tension if the very top of the display is at eye level, thus requiring you to focus slightly downward to view the screen. While finding the perfect placement is largely a combination of proper desk and chair, you can improvise by propping up, say, a too-low screen with some old telephone directories or bricks. Tilting turntables can also compensate somewhat for less-than-ideal display height.

"COMPUTER ERGONOMICS IS DEVOTED TO MAKING PEOPLE FEEL PHYSICALLY COMFORTABLE AND STRESS-FREE WHILE SEATED AT A MICRO."

RESOLUTION

No matter how carefully you plan the best environment for your home computer, your efforts will be of limited value if the monitor itself does not provide adequate resolution, or sharpness. Resolution is measured by the total number of dots that can be displayed on the screen. Generally, the more dots the better the viewing clarity. However, it is important to first determine how you will be using the computer. A higher resolution (more dots) is helpful when working with word processing or spreadsheets since there's so much text on the screen. That's why monochrome screens, which usually offer better resolution than color monitors, are often preferred for these applications. Remember that monitors usually produce a sharper image than television sets and, as long as the proper connections are used, can be hooked up to a variety of microcomputer brands.

If you plan to use a TV set instead of a monitor and you're concerned about harmful effects of radiation, you should know that color TV sets built before 1970 were not subject to federal regulations limiting radiation emissions. Therefore, they could be hazardous to your health after long periods of use.

NOISE

Aside from having sore eyes, some computer users become disturbed by the sound generated by their systems' printers. Indeed, an impact printer—which can create either letter-quality or dot-matrix copies—can produce significantly high-pitched clicking, as opposed to, say, a thermal printer, which is much quieter. One way to muffle an impact machine's clatter is to place the device in an acoustical cabinet lined with foam. The Van San Corp. is one company making these metal-and-plexiglass enclosures in various sizes, priced from about $175. *[If you're handy with tools, you might want to build your own printer cabinet. See "How to Build a Printer Muffler for Under $20," page 96.]*

INSULATION

If you're willing to take a more elaborate route, you can insulate the entire room with sound-absorbing material. This could entail lining the walls with carpeting or "upholstering" them with a foam-backed material such as "Deeptuft," manufactured in several patterns and textures by Colamco, Inc.

One relatively inexpensive sound-proofing approach is to construct a dropped ceiling, covering it with tile like Armstrong's "Texture" series. If you are able to launch a major overhaul, you might remove the original ceiling, then install insulation made of fiberglass. In addition, panels of double-layer sheet rock can be placed over existing walls.

A carpeted floor, of course, will further absorb sound. But bear in mind that the static electricity sometimes generated by walking on wool or synthetic fibers can damage computer software. This can be avoided by using special carpeting woven with antistatic threads or purchasing an acrylic mat that automatically discharges static when stepped on.

As you can see, numerous measures can be taken to more comfortable, healthful computing. But before you rush out to the neighborhood computer or office-supplies store, be sure to analyze your particular situation to determine the origin of any problems. It may be, for example, that your eyestrain is stemming from vision difficulties. "Working at a screen is a completely new visual task," says Manhattan optometrist Melvin Schrier. "Because of this, even if you wear glasses for other purposes, you may need special lenses while using the computer." For example, the glasses you may wear for reading or driving may not be the correct prescription for when you sit at the computer. Or, your doctor may want to prescribe tinted lenses. It's important to tell your eye doctor, during your annual exam, exactly how much time you spend at the computer.

You might also do well to heed the advice of Richard Koffler, publisher of the *Ergonomics Newsletter* in Santa Monica, California. He urges: "Don't buy the solution before you see a problem." FC

Making up Your Mind With VisiCalc

A SPREADSHEET PROGRAM TAKES THE DIRTY WORK OUT OF DECISION MAKING

BY JEANNE CHOFFEE

Every computing family has its pioneer—that imaginative soul responsible for innovating new and unusually effective applications for the computer. In the Ayer family of five, that explorer is 15-year-old William.

William is the one who's been working with computers since fourth grade. He's the one who helped his mom, Lynn Ayer, fashion a program to keep track of the multitude of trees and shrubs she uses in her landscape design firm operated out of her home in Greenwich, Connecticut. He indulges his 12-year-old brother, Ethan, in an occasional arcade game or two. He also teaches computer programming as a volunteer tutor for fifth graders at the local elementary school. And it was William who introduced his family to the power of *VisiCalc*.

VisiCalc has earned itself a reputation as a valuable business tool. William's father, Douglas Ayer, brought it home last year to learn how to implement it in his manufacturing company. Commonly known as an "electronic spreadsheet," *VisiCalc* serves as a huge computerized ledger page. It simplifies all of the repetitive calculations required to figure out profit-and-loss statements, payrolls, budgets, and such. On the basis of formulas that you enter into the spreadsheet, the program will automatically readjust figures you have input. *[See the review of* VisiCalc *in What's in Store, p. 138.]* If you set up the correct model, the spreadsheet will do all the necessary recalculations when there's a change in your business. It puts an end to much of the tedious pencil work that plagues so many small businesses.

One particularly useful function that the *VisiCalc* designers might not have foreseen was the one that William hit upon in the family room one night last November.

A DILEMMA

William was facing something of a dilemma. He was trying to figure out where he should apply to prep school. In a way, he was in a rather privileged position. He didn't have his dad breathing down his neck, telling him where to go. His marks and extracurricular activities were solid enough to get him in just about anywhere he wanted. Most important, he had the funds so that he wouldn't have to rely on scholarships. In short, he had a big decision to make and he wanted to make it wisely.

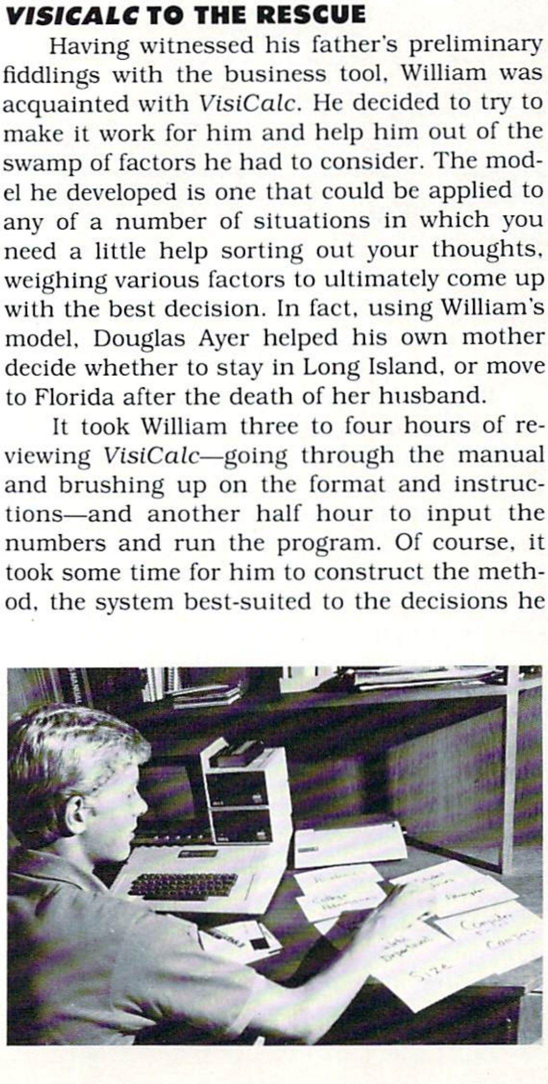
"Some of my friends spent more time deciding which movie to see on a Saturday afternoon," he recalls. Some cared little for the academic quality or factors like the computer facilities to be had at any given school. They tended to base their decisions on whether or not they had friends or relatives who'd graduated from the school. But William wanted to consider many factors. He had a variety of criteria and no pressure or guidelines. He needed some help.

VISICALC TO THE RESCUE

Having witnessed his father's preliminary fiddlings with the business tool, William was acquainted with *VisiCalc*. He decided to try to make it work for him and help him out of the swamp of factors he had to consider. The model he developed is one that could be applied to any of a number of situations in which you need a little help sorting out your thoughts, weighing various factors to ultimately come up with the best decision. In fact, using William's model, Douglas Ayer helped his own mother decide whether to stay in Long Island, or move to Florida after the death of her husband.

It took William three to four hours of reviewing *VisiCalc*—going through the manual and brushing up on the format and instructions—and another half hour to input the numbers and run the program. Of course, it took some time for him to construct the method, the system best-suited to the decisions he

"THE COMPUTER ENHANCES DECISION MAKING. IT'S NOT A SUBSTITUTE FOR IT."



JEANNE CHOFFE *is president of Electronic Marketing Services, a division of Kane, Bortree & Associates, a New York City–based firm specializing in new products development.*

PHOTOGRAPHS BY PETER KARAS

MAKING *VISICALC* WORK FOR YOU:

Here's how you can use William Ayer's adaptation of his father's *VisiCalc* program to help you make a decision.

He listed his choices of possible schools along the vertical axis, with the criteria important to his decision along the horizontal axis. In order to use William's model, replace his schools with your list of options, and his criteria with your criteria.

You'll probably have more than three options and three criteria. If so, adjust the model accordingly. For example, if you have seven criteria instead of three, in line c. of Step 2 change B3.E3 to B3.I3; in Step 3 change D9 to H9 in line a., D10 to H10 in line b., D11 to H11 in line c.; and in Step 4, change >E4: to >I4: and E5.E6 to I5.I6. Similarly, if you're selecting from more than three options, six, for instance, add three lines in Step 2, adjust the coordinates for calculation of weighted scores in Step 3 (change >A9: to >A12:, and C9.D9 to C12.D12; etc. for all subsequent lines in Step 3), and in Step 4, change B9.D9 to B12.D12 and E5.E6 to E5.E9. It sounds complicated, but go through William's model a couple of times and you'll get the feel of it.

STEP 1
Set up the spreadsheet, creating the space you will need to input the kinds of choices and criteria with which you are dealing:
a. /CY
b. /GC12 Ⓡ
c. /GFL

STEP 2
List the criteria, the weights assigned to each, and your possible options. (In William's case, his options were the schools he was considering.) You'll be able to go back and change the values you've assigned to the various criteria you're using.
a. >A1: Criterion → Size → Academics → Cost → Total Scores Ⓡ
b. >A2: Weight → 4 → 9 → 8 Ⓡ
c. >A3: /-- Ⓡ /R Ⓡ B3.E3 Ⓡ
d. >A4: School X → 5 → 8 → 8 Ⓡ
e. >A5: School Y → 4 → 8 → 6 Ⓡ
f. >A6: School Z → 8 → 9 → 5 Ⓡ

STEP 3
Having set up the model and entered the preliminary values, calculate the weighted scores by typing in the following:
a. >A9: School X → +B2*B4 Ⓡ / R Ⓡ C9.D9 Ⓡ RR
b. >A10: School Y → +B2*B5 Ⓡ / R Ⓡ C10.D10 Ⓡ RR
c. >A11: School Z → +B2*B6 Ⓡ / R Ⓡ C11.D11 Ⓡ RR

STEP 4
Add up the weighted scores to arrive at a total score for each option:
>E4: @ SUM (B9.D9) Ⓡ / R Ⓡ E5.E6 Ⓡ RR

STEP 5
Scroll the total scores into view, next to their corresponding options:
>A1: / TV

Ⓡ = RETURN key
→ = Right-arrow key

Note: William used the *VisiCalc* program written for the Apple II/II plus/IIe. Versions are also available for Atari, IBM, and TRS-80 computers. You may have to modify slightly the commands given here when using one of these versions.

STEP 1: SORT OUT THE FACTORS.

STEP 2: CONSTRUCT THE MODEL; ENTER THE FACTORS.

STEP 3: WEIGHT THE CRITERIA; ENTER THE FORMULAS.

STEP 4: ENTER THE VALUE OF EACH CRITERION.

STEP 5: THE SUM OF THE VALUES EQUALS THE PRELIMINARY SCORE.

STEP 6: THE VALUES REVISED; THE SCORES READJUSTED.

STEP 7: THE DECISION MADE.

needed to make. But after all, it wasn't the computer that was doing the thinking. It was William.

Step 1: William sorted out the various factors and elements figuring in his decision. "*VisiCalc* doesn't really tell you what to do," William explains. "It just forces you to decide what's most important to you." Having narrowed the field down to six schools that appealed to him in one way or another, William then had to sort out what it was he wanted out of the experience.

William loves sports like basketball and lacrosse and knew he wanted good playing fields and a big gym. But academics was also at the top of his list of priorities. Other important factors included size, cost, and distance from home. **Step 2:** William entered the names of the schools he was considering on the vertical axis of his model spreadsheet, and their criteria on the horizontal axis.

Step 3: William figured out how important each of these factors were. He weighted each criterion on a scale from 1 to 10, according to its importance to him. To help him calculate the correct weight of these elements, he used 3 × 5 index cards: one card per criterion. By shuffling the cards and removing them, and comparing them two at a time, William got a better picture of what was most important.

Academics came out on top, with a rating of 10, while the schools' dining facilities received only a 3. After all, as William admits, "The school's cooking will never be as good as my mom's." These values he entered into the spreadsheet as a formula, one formula for each criterion.

Step 4: Having figured out the priority of the various questions to consider, William determined the value of each particular school in which he was interested. He assigned the numbers 1 through 10 to each category, based on the information that was available to him—reports from friends, catalogs, and brochures. By multiplying the objective value of each category (the number he had determined with his 3 × 5 index cards) with the value he had assigned to the same category for a particular school, William came up with an overall score for each criterion. For example, William considered the size of any given school to be a 4 in relative importance to other factors. If he gave a specific school a rating of 5 for its size, he multiplied 4 by 5, arriving at a value of 20. **Step 5:** The sum of all of the values became the score for that particular school, a preliminary score, of course. William performed all these calculations using the formulas he had programmed into his model.

Step 6: William revised his evaluations after having visited the schools, sampled the food, fiddled with the terminals in the computer labs, played games of one-on-one on the schools' basketball courts. Thanks to the versatility of *VisiCalc*, he could return home and readjust total scores on the basis of what he had seen and experienced. The revised calculations and values helped give William a clear sense of which school he ought to attend. The high scorer was Groton, a small school in a pretty town in Massachusetts. That's where he is today.

"It sounds like I made a life decision based on what a bunch of numbers said," William comments. "It's scary to think of it in that way, and it's really not true." He had had hunches, certain gut impressions about each school. *VisiCalc* and the computer enabled him to put his feelings into perspective and to view his options logically.

"I really did want to go to Groton," William says, "But I had difficulty explaining the reasons why. Using *VisiCalc* gave me more confidence in my decision. The final scores are really just summations of all your judgments. The computer enhances decision making. It's not a substitute for it."

Take a little time with a program like *VisiCalc*. Follow the kinds of steps William followed, take a look at the instructions on this page, and make *VisiCalc* do the dirty work of your decision making.

Machine Politics

OUTNUMBERED BY REPUBLICANS, THESE SMALL-TOWN DEMOCRATS ARE ORGANIZING TO FIGHT BACK IN LOCAL ELECTIONS—WITH A COMPUTER.

BY JEFF BALL

Local politics in suburban Springfield, Pennsylvania, may never be the same—the Democrats have a computer. To be more precise, I have a computer (an IBM PC), and have made it available to my local Democratic party. The Democrats in Springfield need all the help they can get since they are outnumbered more than three-to-one by Republicans.

My wife, Liz, and I have been active in local politics as volunteer workers for almost 15 years. Liz was an elected committeeperson for more than 10 years. During this time we have addressed thousands of envelopes and made hundreds of phone calls in elections for mayor, district attorney, school board members, and county commissioners. It's so great to replace those piles of 3 × 5 cards with a few 5¼" disks and a whole bunch of computer power.

We're using our new political tool to keep track of volunteers and contributors, maintain

JEFF BALL *writes a column called "Suburban Homesteader" for three southeastern Pennsylvania newspapers, and is author of the book,* The Self-Sufficient Suburban Garden, *published by Rodale Press.*

up-to-date street lists, analyze past voting patterns in our township, and prepare mailings. In the future, I suspect, there will be a number of additional applications.

HOW IT'S DONE

I don't have any more free time than anyone else does, so I offered my computer to the local party on two conditions: 1) that we use commercial software, because it's much more sophisticated than anything we could program, and 2) that other people be responsible for putting the data into the computer. I left all the fun things for myself—formatting the data files and designing the various reports we need.

"BECAUSE OUR COMPUTER LIST IS UP-TO-DATE AND INCLUDES TELEPHONE NUMBERS, WE CAN CALL THOSE WHO HAVE NOT YET VOTED ON ELECTION DAY AT A MOMENT'S NOTICE."

We have a computer committee of five people who are active politically, and also interested in computers. They have served as an advisory committee from the very beginning of this project, early in 1983. The committee decided what we wanted to do with our new tool and then took responsibility for finding people to collect the data and store it on disks.

Our costs are minimal. The organization pays for the few disks that are needed and reimburses me for the paper and the labels that we use. I had the software already, so that didn't cost us anything; but if we had needed to buy new software for this project it would have been tax deductible up to the legal limits of political contributions.

KEEPING TRACK OF VOLUNTEERS

Our first project was to build up a file of all the Democrats (and even a few Republicans) in town who in the past had made some kind of contribution to the Democratic party. We wanted to keep track of the people who were willing to work on election day, who had helped us hand out literature during a campaign, and, of course, those who had given money.

In designing the file, our first task was deciding what information we wanted to keep. Everyone on the committee had a different opinion about what was important to keep and what was not. In developing a computer file, the rule is: "When in doubt, leave it out." Otherwise, you will drown in useless information that seemed relevant just two years ago, but is now clogging up your files. We solved most of our disagreements by having a paper form that served as the input document. The form had more information than we put into the computer file, which generally satisfied those committee members wanting to keep track of whole life histories.

IN DEVELOPING A COMPUTER FILE, THE RULE IS: "WHEN IN DOUBT, LEAVE IT OUT."

With this information at our fingertips, I can envision the following scenario in the near future. Election time is coming, and we need some money to pay for our candidate's brochure. He needs another $200. The treasurer boots a disk and does a search through the data file. We're looking for all the people who have given money to the party in the past, and who are in the education field, since our candidate is a teacher. Out come five names showing their contribution records. We select two who have not given in the past year and call them. We get $150. Only $50 to go.

CHOOSING SOFTWARE

The next issue I had to deal with was which data-base management software we should use. I have two programs (*Data Base Manager* by Alpha and *PC-File* by Jim Button), and either one could have done the job. The problem was that each program has slightly different characteristics, and I had to figure out which would best fit our needs. I ran some dummy information through both programs and finally decided to use *Data Base Manager*, because I liked some of its report formats a bit better.

There are probably a dozen data-base management programs that cost less than $100 available for various personal computers. Most of them can do everything we need in our local political activities. Note, however, that if you want to use your computer for detailed tracking of election-night returns, you should use a spreadsheet program rather than a data-base manager.

MAINTAINING STREET LISTS

Most county governments in the U.S. provide local political organizations with lists of all registered voters and their party affiliations, organized by street. These "street lists" are invaluable for campaigning and for distributing leaflets and information. The problem in most areas is that these lists are not updated very efficiently. We have solved that problem in Springfield by putting the township street lists onto my computer so that we can update them ourselves after every election. This allows us to distribute or mail literature more efficiently, and it gives us more accurate information to use on election day.

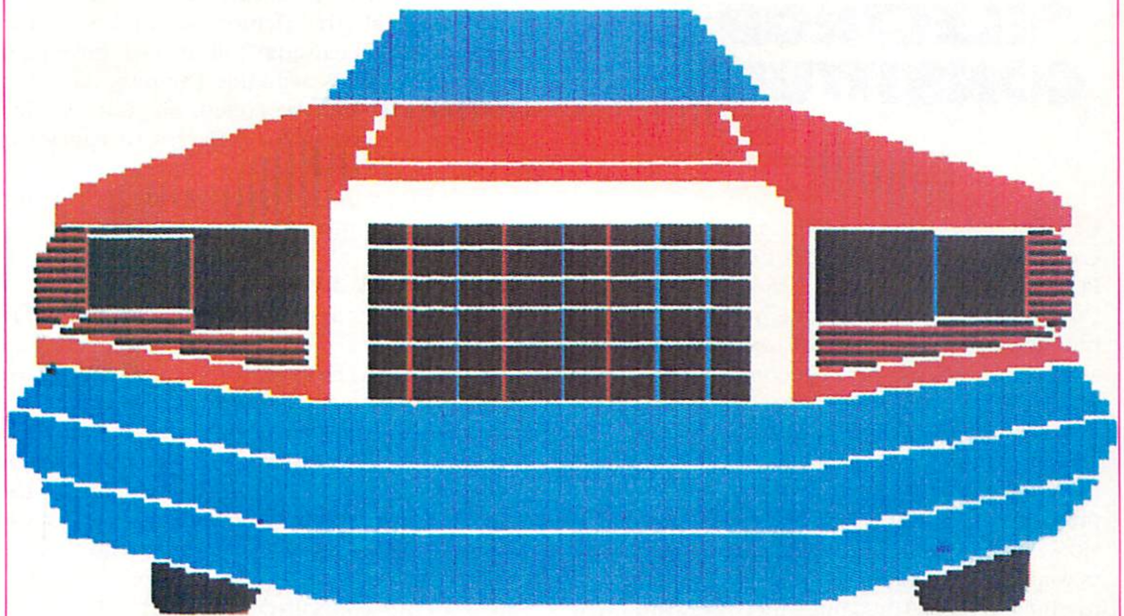
GETTING DATA

One very important part of our strategy here in Springfield is still unproven, and probably will be for a year or two. Anyone who has been politically active appreciates the importance of the committeeperson or precinct worker. How well we will be able to involve all of the precinct workers in this whole project is critical—because they are the source of much of the information that makes this computer project worthwhile.

A good worker makes it his or her business to know when someone moves or needs an absentee ballot, as well as when a new resident registers as a Democrat. A good worker has a network of block captains and knows who the best workers are when we need to hand out a batch of literature or monitor the polling place.

Our committee has discussed this issue at great length. Since our project is only six months old, we won't know how we are doing until at least one more election after this November. Our belief is that if we are able to give

TRS-80 FOR MAYOR



BUMPER STICKERS BY COMPUTER

"Most elections in this country aren't for President, you know," says John Sawicki, president of Sawicki & Sons, a printing company in Detroit. "Most elections in this country are for small-town mayors, sewer commissioners, stuff like that. They're local elections."

The Sawicki family has been in the business of printing political bumper stickers and posters for 14 years. Two years ago, they started designing their bumper stickers and posters on a computer. That's because John Sawicki bought a TRS-80 Model I and taught himself how to program at home.

Sawicki has since upgraded to a Model II, and programmed custom software to aid in the design process. "We do bumper stickers like 'Elect Jones for Mayor,' nothing gimmicky. We used to do them by hand, through trial and error. Now we do it by computer, and it's significantly faster," says Sawicki, who doesn't want to reveal his program formula. "It would only be of value to my competitors."

Sawicki says his company is the biggest in its field in the Midwest, and does work for local, regional, and national candidates throughout the North Central U.S.

When candidates, most of whom can't afford high-priced political consultants, come into Sawicki's office to discuss bumper sticker design, they often probe him for more sophisticated political wisdom. "We tell them what voters to target, who's most likely to vote, and where to spend money. A lot of the candidates say, 'I think I can do this on my computer.' I tell them to go for it.

"In an off-election year, the biggest election may be for City Council. In a town with 40,000 registered voters, only 7,000 may vote. You don't want to waste 33,000 pieces of direct mail on unlikely voters. The best way to find out where to send the mail is by running past voting records through the computer."

Because Sawicki believes most local elections are won with hard-nosed, door-to-door campaigning, he advises candidates to use the same computer-generated mailing-list information to lay out "walking maps."

The most surprising thing about Sawicki & Sons' computer shop is that they use a TRS-80 computer, with a black-and-white screen display, to design bumper stickers and posters, which are almost always in color. "We have a standard set of colors to use," says the polished politicker. "We already know what's good for visibility, what sells."

—NICK SULLIVAN

"MOST ELECTIONS IN THE U.S. ARE FOR SMALL-TOWN MAYORS, SEWER COMMISSIONERS, STUFF LIKE THAT. THEY'RE LOCAL ELECTIONS."

COMPUTER GRAPHICS BY CURTIS WASHINGTON

Congressman Robert Edgar at home with his son Bobby. Edgar uses his computer every morning to call up news services.

A COMPUTING CONGRESSMAN WITH "ELECTRONIC" CONSTITUENTS

Before leaving home in the morning, Congressman Robert Edgar (D.) of Springfield, Pennsylvania, sits down at his TRS-80 Color Computer. Using the modem connected to his computer, he calls up one of the news services and reads news accounts about the previous day's events. He can access articles from the U.P.I. wire service, which is made available through the House of Representatives Information Service, by typing in key phrases such as TRANSIT STRIKE or TAX REVISION. In particular, he looks to see how newspapers in different parts of Pennsylvania have treated the same story. He wants to know what the voters—especially those in his district—are reading.

When he reaches his office in Washington, D.C., he checks his computer there to see if any of his constituents have left any "electronic mail." In his regular newsletter to constituents, Edgar has given out the phone number and password to his "bulletin board." People with a computer and a modem at home can call in any time and type their messages. They will be read.

Edgar, as chairman of the Congressional Clearinghouse on the Future, is acutely aware of the impact microcomputers will have on the lives of Americans. "In 10 years, there will be few people in our society who will have a job that is not in some way computer-related," he said in a recent interview with FAMILY COMPUTING. He also predicted that in five to 10 years, all new TV sets will come with computers built in as standard equipment.

IN HIS NEWSLETTER TO CONSTITUENTS EDGAR HAS GIVEN OUT HIS PHONE NUMBER AND PASSWORD TO HIS "BULLETIN BOARD."

Edgar is equally well aware of the ways in which politicians are and will be using computers. "Computers will really democratize the whole political process," he says, "by allowing poorer candidates the power to compete." In fact, some political observers think that in a few years candidates without funds for advertising in the traditional media will be able to access millions of voters via electronic mail.

If 1960 was the year TV first really contributed to the "Making of the President," as author Theodore White observed, 1984 may be the first year computers make a similar contribution. Stay on-line. —J.B.

precinct workers handy updated street lists for every election, they will see the benefit of giving us updated information.

One obvious benefit of the computer for precinct workers is that those same street lists can be printed out as mailing labels. So any precinct worker who wants to address some materials to all the Democrats in his or her precinct quickly can just call me and have peelable mailing labels available the next day. And the street lists can be coded, so that mailing labels can be printed for different categories of persons. If you ever had to address 1,000 letters by hand, you know how wonderful mailing labels are for eliminating hand cramps.

STATISTICAL ANALYSIS

We've just started to use our computer to analyze voting records. Because we felt that other projects were more important, we put the analysis ideas on the back burner. But we have gotten (from our township office) the voter turnouts for elections in the past five years. By making a simple chart of turnout against the number of registered voters, we can see clearly which precincts are the most active and therefore deserve the most workers on election day. Several of our committee members want to get into more sophisticated analysis of election results; maybe next year we'll find the time.

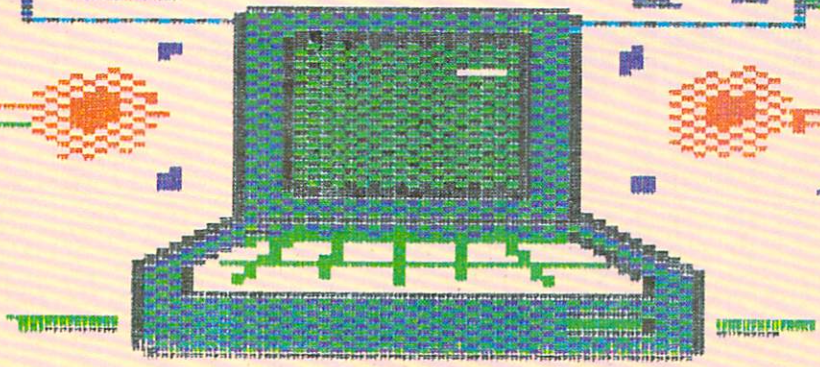
ELECTION DAY

In the meantime, we're pleased with our political computer. Getting ready for the election this November has been much easier for the volunteers. We have better control of our mailings, and are not wasting time and money sending election materials to inappropriate addresses. We can also give our election-day workers good current information about the voters in their precinct, which they never had before.

For example, one time-tested trick on election day is to check off the names of people in your precinct as they come to vote. Then at 6:00 p.m. you have a list of all the other registered voters who have yet to show up at the polling place. Because our computer list is up-to-date and includes phone numbers, our workers can start calling people to bring out the vote—without wasting any time. They call only those people who have not yet voted, and they have those phone numbers right at their fingertips.

I'm sure we'll come up with some changes in our system after this next election. Although the committee already has some ideas, we want to wait until after the election so that we can get the opinions of the election-day workers. Our computer may not win an election for us, but we know for sure that it makes the work of our local Democratic party easier. If that makes for a more active democratic process in Springfield Township, then all of our efforts will have been worth it. FC

TO BLIPPER



When we talked of your coming, I longed to say nay
but now it's too late--you're here to stay.

You're like a new baby, you pest, you intruder;
your theft of my offspring couldn't be ruder!

You're a new kind of sexy, a sly occupation
controlling my family through infatuation.

You've infested my brood, and you're worse than a pet;
you've even usurped the TV set.

All you VICs and you Apple Two Plusses and Three's
come better equipped to do homework than me.

Your infernal bleeping filling the air
has made conversation seem suddenly rare.

My words may get processed and data retrieved
but my great sense of loss still isn't relieved.

And I find myself dreaming of unprogrammed calm
as I learn to distinguish RAM from ROM.

If you'll keep my books balanced and help plan each meal
I may learn to love you. Do we have a deal?

Affectionately,

Mom

Poem by Suzanne Ramos

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How to Tame Your Beastly Computer

A LIGHT-HEARTED LOOK AT THE LAWS OF THE JUNGLE, AND HOW TO AVOID THE MOST COMMON ERRORS NOVICES MAKE

BY BETH POWELL

You open the cartons housing the components of your brand-new microcomputer and carefully lift out each unwieldy piece. One looks like a TV set and the other like a new kind of electric typewriter. Wires, wrapped up and tied neatly in figure-eight loops, hang from the back of each unit, and at the end of one you recognize the familiar three-prong plug—a power cord, of course!

But there are other wires too, some of them with stranger looking plugs, or odd connectors—rows of pins like little silver teeth. For a moment you wonder—about the mysterious wires and gadgetry that must be inside this new machine.

You sit back for a moment and take a survey. All right, then—there's a power cord on each of these machines so you figure there should also be—you lean forward, searching nervously . . . where is it? Yes! An "on" switch. Why did they hide it way back there?

"YOU MEAN TO SAY YOU JUST TOOK IT OUT OF THE BOX AND PLUGGED IT IN?"

And then you wonder: What would happen if you simply plugged it all in . . . and turned it on?

Would it light up? Would it make a noise? All your familiar appliances do something when you turn them on: At the flick of the appropriate switch, your blender starts whirring, your car starts roaring—even your stereo turntable starts going around. You reach forward, grab the nearest power cable and uncurl it, scanning the baseboards for a three-prong outlet.

But wait, hold on. You can't just plug it in without knowing what to expect. It was expensive, after all. What if it blows up? And think of the chagrin you'd feel, taking the charred fragments back to the store and cringing as the salesperson asks in sneering disbelief: "You mean to say you just took it out of the box and plugged it in?"

No way. You fumble far down in the bottom of the box, searching for the owner's manual. Here it is, but what's this pamphlet? Assembly instructions? "Take the red cable at (A) and plug it into the . . ."

Blushing, you realize that you had considered turning the machine on without even putting it together. Of course! The typewriter thing has to be connected to the TV set before anything can happen.

WHY NOT PLUG IN?

So now you've got the—monitor?—hooked up to the—keyboard?—and you've even plugged the power cords into the wall. Looks pretty official. So what the heck. Reaching forward you—click! click!—turn the system on.

It doesn't blow up. In fact, nothing much happens. The screen just glows at you, with a small shape appearing in one corner beneath the neatly printed word READY.

Ready eh? For what? You grab the owner's manual. A manual, you think, you're familiar with. Your blender manual told you to "push the HIGH button and button number 10 for fresh, fully grated cabbage." Okay, you can handle that. Lots of buttons in view here—a whole keyboard full of them—but a button is a button, isn't it? All you need to know is which button to push for each of the different things you want the computer to do. Before opening the manual you already picture the list: Button "A" for fast, easy checkbook balancing; button "B" for effortless list making and indexing; button "C" for ready-made income tax calculations, and so on.

But what's this? No list. The manual reads

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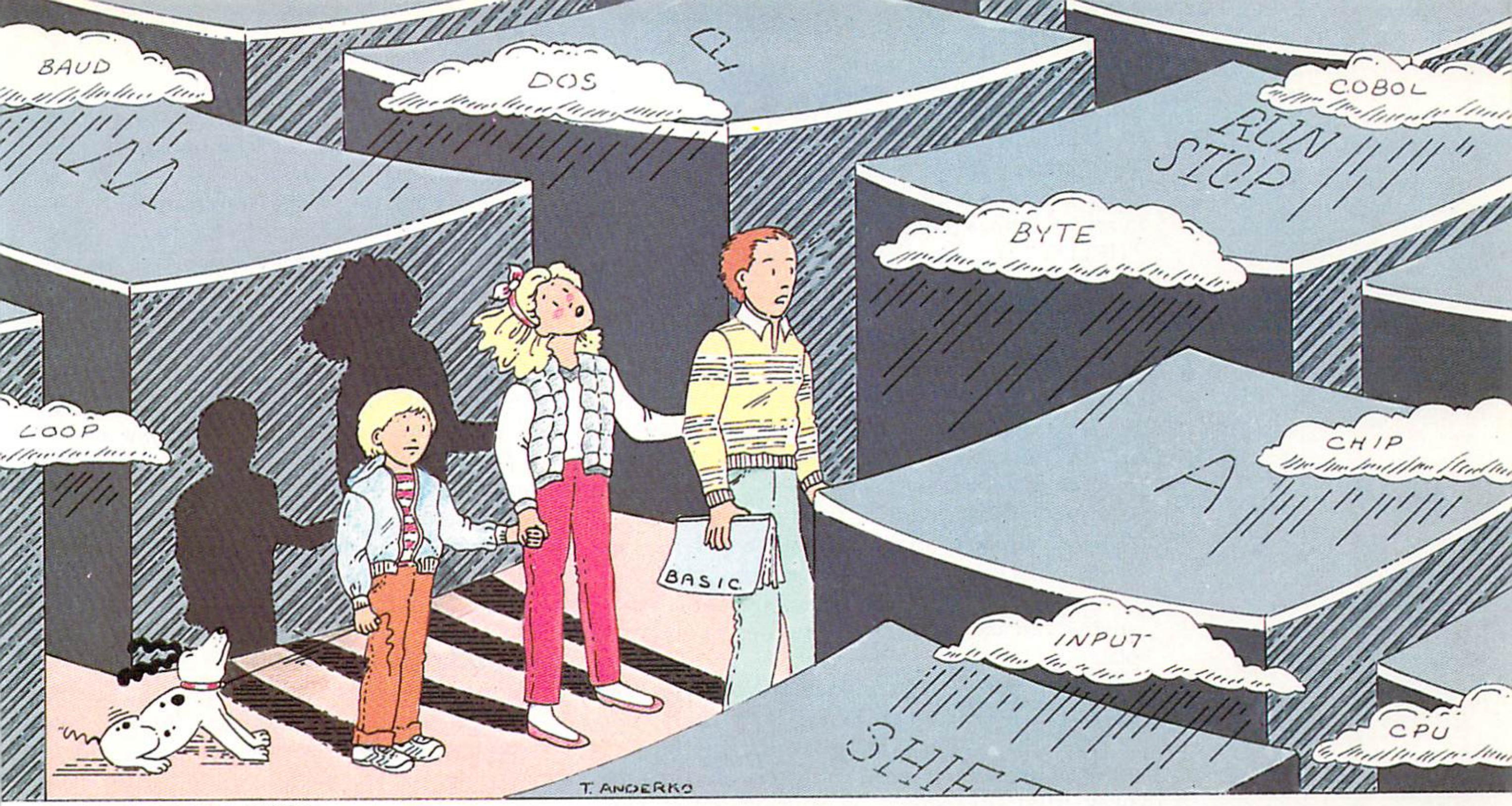


ILLUSTRATIONS BY TERESA ANDERKO

like a book and seems to have nothing to do with pushing buttons. Why can't things be easy? You begin leafing through the pages.

A LIGHT IN THE TUNNEL

Aha! Almost immediately, a sentence in Chapter 1 catches your eye. "You should realize that your new machine, by itself, can do nothing. You, the owner, must tell the computer what to do." Well! that's perfectly logical, isn't it? Just talk to the computer and tell it exactly what you want it to do.

With a sense of purpose, you type, BALANCE MY CHECKBOOK, a perfectly logical request (in fact, one of the things the salesperson absolutely promised you the computer could do). The words appear on the screen, as you figured they would, but nothing happens. Now what? You look over the keyboard, and finally come upon a key marked ENTER (or perhaps RETURN). Makes sense, doesn't it? You want to "enter" your request, don't you? You press the key, Ack! Something happened! You crane forward, reading the words that have magically appeared on the screen: SYNTAX ERROR.

Disbelief. What's a syntax error? Your spelling is right. Shouldn't the computer explain? Isn't it supposed to be user-friendly or something? You open the manual again and find the sentence that made you feel so good before.

"You, the owner, must tell the computer what to do. At the most basic level, telling the computer what to do is called programming. When you program a computer, you are telling it what to do in a special language it, the computer, can understand. Such a language, BASIC, is built into your computer. You can start learning to program your computer in BASIC right away. Just turn to Chapter 2.

SO THAT'S "SOFTWARE"?

A special language? You read on. "But there's an easier way of getting your computer to do something useful, without programming it. A wide variety of ready-made programs may be purchased that let your computer do many entertaining and useful things: from games, to balancing a checkbook, to figuring your income tax. Working with published programs—called "software"—is usually much easier and more convenient than learning how to program."

Published programs? Software? So that's what the salesperson was trying to get you to buy when you picked up the computer!

So no software. What's your alternative? Programming? The BASIC language? Grimly, you turn to Chapter 2, "Introduction to BASIC," and start in.

"The BASIC language is the simplest and most popular programming language for microcomputers. BASIC stands for Beginner's All-purpose Symbolic Instruction Code, and was developed at Dartmouth College . . ." Blah, blah, blah. Finally, after a long introduction, you reach the first example: Print "HELLO" (ENTER).

Duly you type: HELLO. You press the ENTER key. Result: SYNTAX ERROR.

You look back at the manual with new resolve. OK. You see here that you made a mistake. You were supposed to type in the word PRINT, too.

PRINT is a command that tells the computer to print something on the screen. Oh! So the object of this exercise isn't just to say HELLO to

PUBLISHED PROGRAMS? SOFTWARE? SO THAT'S WHAT THE SALESPERSON WAS TRYING TO GET YOU TO BUY!

the computer, it's to get the computer to print the word HELLO on the screen! Aha!

Confident again, you type from memory: PRINT HELLO, and hit ENTER. Eh? No SYNTAX ERROR this time, but the computer has printed a zero on the screen! Back to the manual. Print "HELLO," it says. Well, this time you're even going to put in those little quotation marks.

PRINT "HELLO", you type, and you press ENTER. Voilà! HELLO magically appears on your screen.

Ah! You sit back and admire your handiwork. You've got something to show the family. HELLO. A good beginning. Can checkbooks and income tax be far behind?

You call everybody in from the kitchen . . . but as you hear the swish of bodies leaving chairs and the clatter of feet on the floor, you look at the screen and realize you don't want anybody to see those SYNTAX ERRORS all over the place.

With new-found confidence, you scan the keyboard and come upon a key that says CLEAR. Hmm. That might be just the button to clear away mistakes. You press it, turning away from the screen as your youngest son comes into the room.

"Aw, Mom," he says, looking over your shoulder. "What did you call us here for? You haven't gotten it to do a thing—there's just that little thing blinking up there!"

You turn back to the screen. No HELLO. No nothing.

"I'VE EVEN HEARD STUDENTS ASK COMPUTERS QUESTIONS LIKE, 'DO YOU BELIEVE IN GOD?' "

NOTHING GAINED, NOTHING LOST

Does this sound like your first hours with your new computer? If so, then take heart—you are not alone. Almost everyone has had a similar experience.

It should be obvious, from the number of how-to books, magazines, and courses devoted to the subject, that learning to program a microcomputer requires learning a large amount of information. Part of this information is general in nature and part specific to your particular computer. But it's essentially just data: things you need to know in order to function in this new environment.

In the weeks that follow the acquisition of a computer, the experienced user will be absorbed in a pleasant, peaceful process of acclimatization.

In contrast, however, the novice's first few hours with a new computer are usually fraught with anxiety and emotion, and sometimes charged with sudden and subtle insight.

The scene above illustrates some of the more common discoveries beginners make in their first encounter with the machine: They learn how computers differ from more familiar appliances; begin to understand the difference between programming themselves and buying software; grasp the idea of a computer language with its well-defined vocabulary and strict rules; and begin to see the need for logic and precision in dealing with these machines. For many, if not most, beginners these ideas come as a sort of revelation, supplanting a misguided sense of what the computer can and cannot do.

"I get a call every week from somebody who tells me, 'I can't make my computer do anything,' " says Lou Rossi, a customer service representative for Radio Shack in Jacksonville, Florida, who also teaches Radio Shack's beginner lessons.

The problem seems to stem from a failure to understand how a computer differs from more familiar machines, such as cars, toasters, and dishwashers. These common appliances are each dedicated to a single task. And they can be made to perform that task by just switching them on and providing the right "input": two slices of whole wheat bread, a push on the gas pedal, or dirty dishes.

A VERSATILE MACHINE

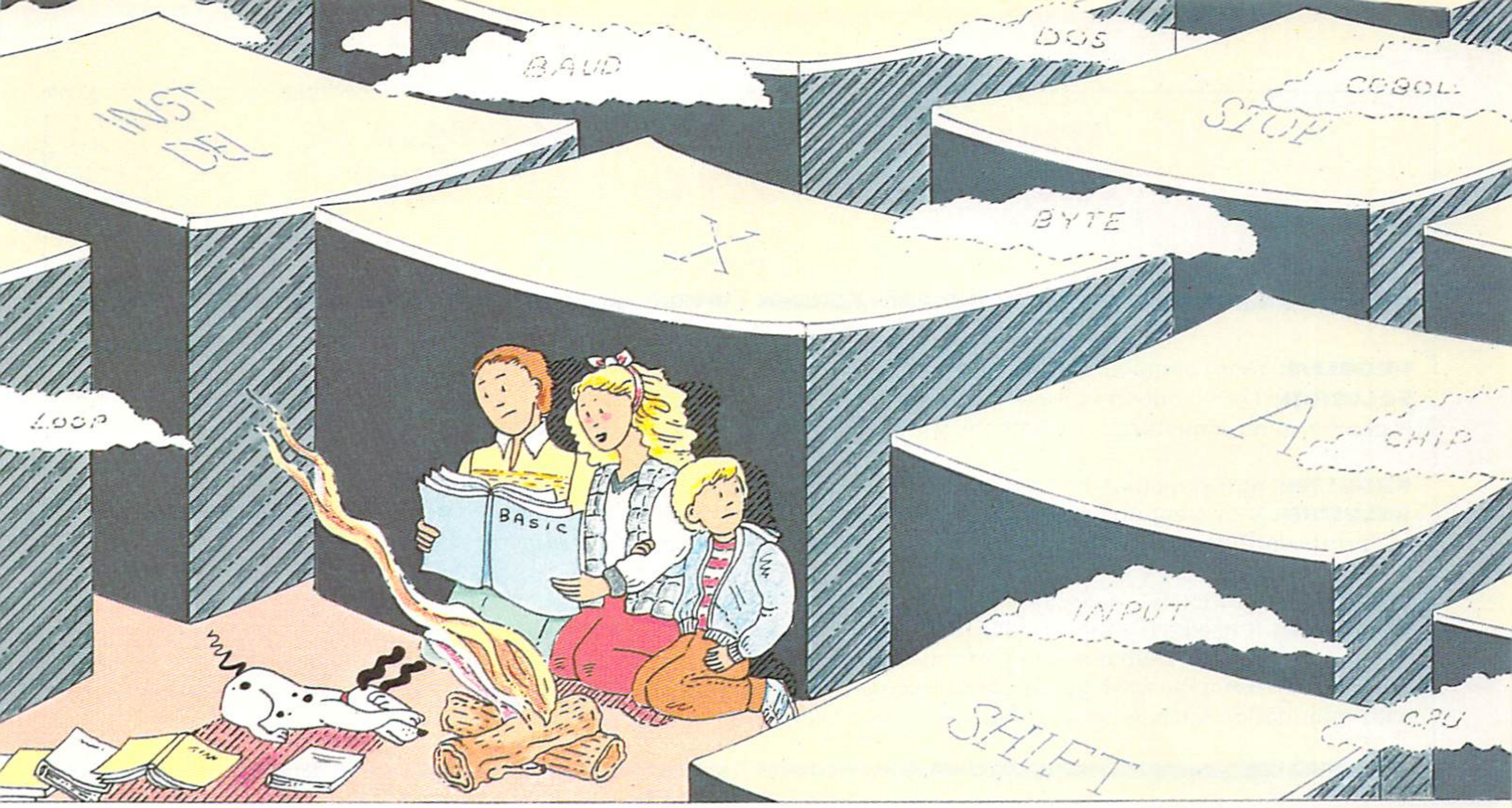
A microcomputer, at heart, is also a simple machine; its arithmetic and logic unit can only add two small numbers together or perform a few other equally elementary operations. The difference, however, is that a computer has flexible memory, which it can use in a variety of ways. It can save the results of its simple calculations for future use, combine them in different ways, store these results, and so on. And it can perform these actions repeatedly and in many combinations according to a list of simple instructions—a program—also stored in memory.

It is this ability to remember things and follow instructions that can make a computer seem so versatile and powerful, let it process words or figure income tax. But the computer's ability to do these things depends on its being given the proper instructions, either in the form of a published program that may be loaded from cassette tape or floppy disk, or as instructions you enter in the computer's own language. Without these instructions, a computer just sits there, its memory a blank slate.

Another problem seems to be a failure to understand the difference between real intelligence and what a computer does under the control of a program. Joey Latimer, an instructor at the Creative Computer Center in San Marino, California (and a regular contributor to FAMILY COMPUTING), thinks that many of his students actually believe computers have minds of their own.

"I've had people ask if there's a person in another room controlling the computers they're using," Latimer says. "I've even heard students ask computers questions like, 'Do you believe in God?' "

Misunderstandings arise because people naturally interpret something new—the computer—in terms of what they are familiar with. Because a computer has a power cord and an "on" switch, they figure it will automatically "do" something when it is turned on, like a toaster does, and they are disappointed when it



doesn't. Conversely, because a computer running under program control seems to be able to process information in an almost human fashion, people assume that a computer has intelligence—but that's just not the case.

THREE BIG TROUBLE SPOTS

To write your programs, you must familiarize yourself with three areas: computer language; logic—how a computer follows instructions, and how to break down a problem into logical steps; and data storage—or how the computer stores information.

1. Learning Computer Language

A computer language is made up of instructions—very exact and sometimes trivial instructions. A computer program, such as a word processor, may use a vocabulary that includes simple, powerful commands: PRINT OUT a file, STORE a file to disk, MOVE a section of text from one place to another. But each of these commands causes whole groups of much simpler instructions to be executed by the computer. Instructions on the order of GET A CHARACTER FROM THE SCREEN. STORE IT IN MEMORY. GO BACK TO THE SCREEN. MOVE OVER ONE SPACE. GET THAT CHARACTER. And so on.

Instructions of this kind make up the computer's machine language—its mother tongue, and the only language it can understand.

Using machine language directly is quite difficult. Luckily, you can use machine language indirectly by programming in BASIC—a language whose vocabulary closely resembles English. Each BASIC word represents the equivalent of several machine-level instructions, and a special program, built into most microcomputers, translates these BASIC commands into machine commands the computer can execute directly.

The prospect of learning a new language may daunt some people—but they will be pleased to know that BASIC is far simpler than any human language in vocabulary and constructions. Why do some people have trouble learning BASIC? Part of the problem seems to be that people expect a computer language to be flexible, as a human language is. In BASIC, however, there is just one correct way of stating a command.

Everything in a BASIC statement means something—i.e., it represents steps to be performed—and that includes punctuation. In fact, BASIC punctuation marks are not punctuation in the normal sense at all, but commands themselves.

BASIC PUNCTUATION MARKS ARE NOT PUNCTUATION MARKS AT ALL, BUT COMMANDS THEMSELVES.

2. Computer Logic

Because people tend to think of computers in terms of what they can do, they often do not realize how uncomplicated the steps are that underlie this apparently sophisticated activity. Computer logic is extremely simple and brutally precise. The computer will perform valid instructions exactly as they are specified. Conversely, the computer will treat invalid instructions as errors. It will never try to understand what you were really trying to say.

For example, quotation marks in BASIC have a special function. The computer interprets as text all characters contained between a pair of quotation marks. Thus, as our novice learned, to get the computer to print the word "Hello" on the screen, you have to enclose the word in quotes: PRINT "HELLO". As shown earlier, if you omit the quotes, the computer displays

THREE TOP PROBLEM SPOTS— AND HOW TO GET OUT OF THEM

1 SYNTAX ERRORS

PROBLEM: Your computer doesn't understand your words.
SOLUTION: The computer can print any word, but it can only understand the words of its own language. To tell the computer to do something, use only the words of the computer language you're using.

PROBLEM: Your punctuation doesn't do what you want it to.
SOLUTION: Your computer doesn't use punctuation marks conventionally; instead, the marks call for functions such as "print continuously." Unless otherwise instructed, use all caps and no punctuation marks.

PROBLEM: Your letters make the computer do funny things.
SOLUTION: If used with the CONTROL key, single letters can also tell the computer to perform functions, such as "stop" and "edit"; and often letters perform different functions in different programs. Either memorize these different functions or use a cheat sheet taped to your keyboard (the bigger companies are now developing templates or cards with information such as this, which will be packaged with the program software).

2 LOGIC ERRORS

PROBLEM: Your computer is processing your information, but the results don't make sense.
SOLUTION: Your program must contain one or more errors. List the program on the screen, or preferably print out a listing, and check it carefully to see that each statement has been entered without superfluous punctuation, that no commands have been misplaced, that all variables and data have been given appropriate values, and that the program steps will be performed in the right order. Remember that the computer will not execute statements in the order in which they are entered, but rather in the order of their line numbers. If you can't figure out what's wrong, go back to the problem itself, and to the steps you have determined will allow the computer to solve it (in computer talk, this is called the "algorithm"). Chances are you have made some error in logic or have failed to take some special case into account. Ideally, you should make a "flowchart," or diagram showing what steps you wish the computer to take and in what sequence. Any good BASIC textbook will show you how to make a regulation flowchart, and it is a useful skill to master.

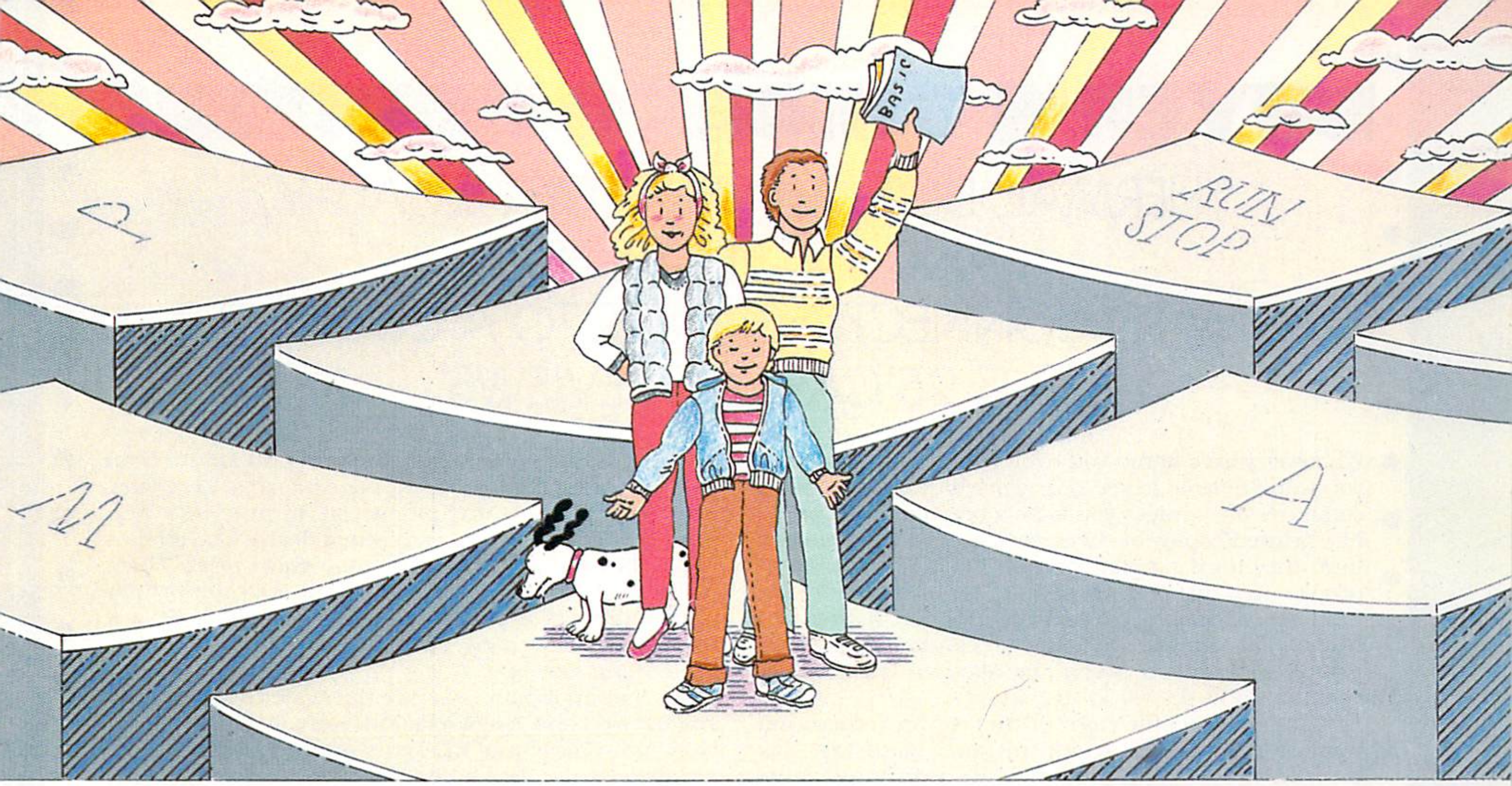
3 "LOST" INFORMATION

PROBLEM: Everything disappears from your screen.
SOLUTION: Did you hit CLEAR? On some computers, this will clear your screen, but your information can be retrieved from RAM by the LIST command.

PROBLEM: You typed in a line and saw it printed on the screen, but when you typed LIST it wasn't in your program.
SOLUTION: One of three things probably happened. You could have forgotten to hit ENTER (or RETURN) after typing in the line (remember that the cursor must still be on that line or the information will not be entered). You may have subsequently erased the line by typing in its line number and hitting ENTER (or RETURN) or by accidentally giving a subsequent program line the same number. Or you may have forgotten to number the line, in which case it was executed immediately, but not included in the program. If your original statement is still displayed on the screen, on many computers you can still save it; just use the cursor control keys to move the cursor to the line the statement is on and make the correction, changing or adding a line number. To record the line in memory, remember to hit ENTER (or RETURN) before moving your cursor off the line.

PROBLEM: You lose everything on your screen, and you can't find it in memory.
SOLUTION: Did you hit RESET, or type NEW, or turn off your machine, or boot up a new disk? All of the above can erase your information forever—unless you commanded your computer to save it first. And if you go back and make some changes in saved information, don't forget to resave it (otherwise your computer will only remember your original).

PROBLEM: You boot up your disk and find that not everything is there anymore.
SOLUTION: Did you put in or take out your disk when the "in-use" light on the disk drive was on? Did you reinitialize the disk? When you were copying a disk, did you push in your original disk when you were supposed to put in the copy? All of the above will cause at least partial erasure of a disk. The solution is attentiveness and some memorization, or a good cheat sheet taped to your keyboard.



"ø". How confusing!

Dennis Dormady, a computer science instructor at Jacksonville University in Florida, makes a comparison between human and computer logic in this way: If you tell a person simply to "take a step," he or she could carry out your command. But in dealing with a computer, you must first tell it "You are standing on both feet." Then, "Lift one foot up." Then, "Place it back down in front of you."

3. Paradise Lost: Where'd It Go?

If you've ever "lost," or thought you lost a program, you know the feeling of helplessness as you watch your words disappear from the screen, or try to call up a program and get nothing.

The reasons the computer "forgets" your program are, again, perfectly logical. But they require some memorization and call for an understanding of the way a computer stores information.

All programs and data you enter into the computer are stored in the computer's Random Access Memory, or RAM. This memory disappears when the computer is turned off. Thus, the most common cause of losing programs or information is forgetting to copy them into a permanent external storage medium—such as disk or tape—before turning off the computer.

There are several ways to lose entire programs from memory in one fell swoop even without turning the computer off. An easy way to zap a BASIC program is to jiggle the computer's power cord accidentally—you may not even notice the screen flicker, but your computer's memory may be wiped clean. Another way to lose the contents of memory is to type NEW, a BASIC command that clears out any program stored in RAM. On some machines, hitting RESET will have the same effect. On others, RESET only clears the screen without wiping out the entire memory. Entering LIST will bring your program back into view.

It is also possible to lose just one or a few lines of your program while the rest remain intact. For example, if you type in the number of a line and then press ENTER (or RETURN), the entire line with that number will be erased from memory. If you forget to type in the line number at all, your computer will perform the command immediately and never add that line to your program. And you must be sure that the cursor is on the line you want sent to the computer's memory when you press the ENTER or RETURN key; otherwise, any changes you have made on the screen will not register.

In order to prevent catastrophes, it is better to save each new program onto disk or tape when you are finished working on it—or even save it several times as you are writing it. And don't forget, if you later make changes to your program, resave the new version.

Remember when you first learned to drive a stick shift? You thought to yourself, "It says here to let out the clutch while pressing on the gas. But how am I ever going to remember to do all that while I'm trying to push this stick over here into the right groove?" And sure enough, the first couple of drives around the block were full of bumps and jolts. But now you, like millions of other motorists, are driving a four-on-the-floor like it's second nature.

Students who master computer logic, like drivers who learn to master their machines only after miles of whiplash and stalled motors, invariably look back to realize how simple it all was. FC

THERE ARE SEVERAL WAYS TO LOSE PROGRAMS FROM MEMORY EVEN WITHOUT TURNING THE COMPUTER OFF.

BUYER'S GUIDE TO PRINTERS

THERMAL, DOT-MATRIX, LETTER-QUALITY, AND INK-JET TYPES; HOW TO CONNECT A PRINTER TO A COMPUTER; PLUS 25 CAPSULE REVIEWS

Whatever you've found you can do with your computer, you won't be able to see your work when you turn the computer off—unless you have a printer. Some people like printed copies of their work even if it's unimportant; they want tangible proof of their exploits. Other people need printed copies—to send letters, record numbers or names, or send a program listing to a friend. For almost any type of computer owner, a printer is a link between the abstract world of the computer and the world they know.

But selecting the right printer for your microcomputer system can be a difficult and confusing task. You can choose from four different printing technologies, most with dozens of models in several price ranges. Today's printers boast a bewildering variety of features, matching pace with the computers themselves in versatility and sometimes, unfortunately, in complexity.

With advances in technology and manufacturing, printer prices have dropped considerably in the past few years. But a printer is still a big investment, often costing more than the computer itself. You should shop carefully, keeping in mind three key questions.

1) Will the printer produce copy high enough in quality for your needs? 2) Is the printer you're considering compatible with your computer, and will it take advantage of the features of your favorite software? 3) If you plan to use the printer on a regular basis, will it be fast enough and will it hold up in a workhorse role?

To help answer the first question, read the following descriptions of thermal, dot-matrix, letter-quality, and ink-jet printers. Check the chart's 25 printer reviews, which include most pertinent specifications. Also check the chart that describes, in capsule form, the advantages and disadvantages of each type of printer.

On the second question, read the sections of this article entitled "Plugging in Your Printer" and "Software Compatibility."

The third question is not so easily answered, because printers are usually more prone to failure than are computers (and can be quite expensive to repair). A good (if unorthodox) practice is to purchase your printer and service contract from a dealer who offers a full-replacement warranty over the short term. Then, in the first few weeks of ownership, run the printer unmercifully to expose any manufacturing defects. If the printer fails early on, you can return it to the dealer for a new one.

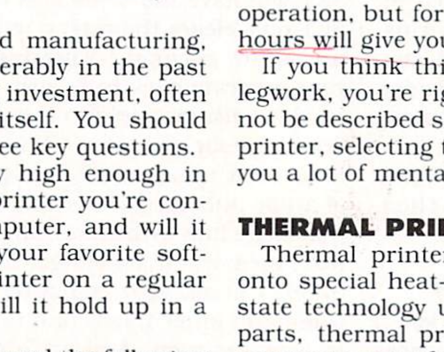
Another approach is to ask the dealer for the printer's **mean time between failures** (MTBF). This is sometimes measured in lines printed, but most often in hours of use. Some manufacturers don't give this specification, for obvious reasons, but being armed with the question might put you on a better footing with the dealer. Some printers that are built like tanks now boast up to 4,000 hours of trouble-free operation, but for casual or sporadic home use 1,000 hours will give you several years worth of hard copy.

If you think this investigation will require a lot of legwork, you're right. Printers, unlike monitors, cannot be described simply. But if you have any need for a printer, selecting the right one from the start can save you a lot of mental anguish and money.

THERMAL PRINTERS

Thermal printers work by "burning" visible dots onto special heat-sensitive paper. Because the solid-state technology used requires relatively few moving parts, thermal printers are extremely reliable, inexpensive to manufacture, and quite compact, so they're especially well suited for home use. Because they are fairly fast, and very quiet, they are also ideal for producing running hard copy of screen displays when the computer is being used as an information terminal.

Thermal printers usually move paper through the machine over a rubber roller (as on a typewriter) in what's called the **friction-feed** method. The special aluminized paper required is usually a glossy off-white, and has a characteristic chemical smell. It most often comes in unperforated rolls, like adding-



A dot-matrix character, produced by thermal and dot-matrix printers, is made up from arrays of dots. The letter "A" shown here was made on a 9 × 7 matrix.

ILLUSTRATIONS BY NICK JAINSCHIGG

machine paper, so individual printouts must be torn off against a toothed edge mounted on the printer's faceplate. The special paper required, sometimes difficult to obtain, more expensive than uncoated paper, and inappropriate for formal use, is the worst drawback of thermals. However, you can make excellent photocopies from this paper.

Because of the thermals' low cost, many manufacturers offer them as part of inexpensive system packages. Some of these thermals, such as the Timex/Sinclair 2040, have features corresponding closely to those of the computer they support and are plug-compatible only with those machines. These printers often use papers of nonstandard width, and print a nonstandard line length proportional to the line length of their host computer's screen display. Some feature built-in software enabling easy graphic reproduction of screen images. Other low-cost package thermals, such as the Apple Silentype, are more generic in design, using standard width (8½") paper and printing more than 80 columns, but have few special features.

THE NEWEST THERMALS

The latest in thermal printers comes from Alphacom and Star Micronics. The Alphacom 42 is a 40-column printer that can easily be connected to Atari, Commodore, and Texas Instruments computers via interchangeable interface cables. A thermal printer that can so easily be connected to a variety of computer brands is a breakthrough. The Alphacom interface cables cost between $30 and $45.

In addition to easy interfacing, the Alphacom 42 offers a thermal print mechanism, built by Olivetti, that can print upper- and lower-case letters plus graphics. The Alphacom can also be instructed by control codes to format the printed text in a number of ways. The Alphacom 42 lists for $199.

Star Micronics has introduced the STX-80, which at $199 may be the least expensive 80-column printer. It can print 60 characters per second (cps), has an expanded character set, and is simple to operate.

DOT-MATRIX IMPACT PRINTERS

Dot-matrix impact printers, usually called just dot-matrix printers, also use the dot process to form characters, but do so on regular paper. Because of this, they can produce copy fit for almost any purpose, except formal business correspondence. It's hard to beat them for speed, versatility, and price. If you need to do a lot of printing—either of manuscript reports for work or school, or program listings—dot-matrix printers are the best buy. If you want to print out color graphics displays, dot-matrix printers are the only choice.

The dot-making apparatus is a printhead, with a row of tiny wire hammers (also referred to as pins). These are driven against the paper through ribbon to

MAIN FEATURES OF THERMAL, DOT-MATRIX, AND LETTER-QUALITY PRINTERS

	Thermal	Dot-matrix	Letter-quality
Best application	Getting printouts of any kind of information or screen displays.	Printouts of program listings, graphics displays, manuscripts, and reports; good for any print work where speed is important.	Formal correspondence, business letters; any printing that requires special paper, such as letterhead.
Paper required	Glossy, aluminized, heat-sensitive paper; usually narrower than the standard 8½" paper	Fanfold paper with holes on edges, perforated to tear into single sheets; also, nonperforated "roll" paper. Sometimes, single-sheet paper.	Single sheets of paper are standard; letterhead paper can be used. Some models accept fanfold paper.
Speed (characters per second)	60–80	80–200	12–45
Line length (characters per line)	22–80	80	80–132
Character formation/style	Dot-formed characters; usually black against "silvery" background.	Dot-formed characters; looks like "computer printout"; in some modes, "near letter-quality" text is possible.	Fully formed characters; virtually identical to look of good typewriter.
Main advantages	Inexpensive, quiet, reliable. Paper produces good-quality photocopies	Extremely fast; can usually print graphics characters, sometimes in color.	Most handsome output. Variety of typefaces available.
Main disadvantages	Paper is expensive, and can be hard to find and awkward to handle. Inappropriate for formal use.	Inappropriate for formal use.	Expensive and slow. Can print only crude graphics.

produce arrangements of dots. Most medium-priced dot-matrix printers use a nine-pin head and create characters in five to seven horizontal steps. They are thus said to have a 9 × 5 or 9 × 7 matrix (see illustration). Some use as many as 24 separate pins, and produce superb characters. A few of the least expensive models use fewer than nine pins, and don't print true **character descenders** (the tails of letters such as "g" and "y" that usually fall below the line). Text without true descenders is unattractive and sometimes difficult to read.

Dot-matrix printers are among the fastest of microcomputer printers, some producing text at as many as 200 characters per second. Most average between 80 and 100 cps. To further improve speed, bidirectional and logic-seeking features are often implemented as well. **Bidirectional printing** means that lines of output are alternately printed forwards and backwards across the page, so that the printhead doesn't have to return to the left margin to print each line. **Logic seeking** means that the printer decides the shortest route to the beginning of the next line following the printing of an incomplete line (as at the end of a paragraph).

Responding to the claim that matrix print is unsuitable for formal business correspondence, many manufacturers of dot-matrix printers have added improved-quality print modes (and are thus referred to as multimode printers).

Three modes are usually offered. The normal, or high-speed **draft mode,** provides fast output for program listings and general use. An **emphasized mode,** which half-spaces the printhead between firings, forming a denser dot pattern in the printed character, slows print speed, but provides attractive and easy-to-read copy. A **double-strike mode,** which prints each line twice, can be used for correspondence-quality printing. This "near letter-quality" feature (as it's often called) does sacrifice speed, however, since it often takes a double pass to deliver this quality—but 35 to 40 cps is an acceptable speed for printing out short letters or reports. Above all, it turns the dot matrix into quite a versatile printer.

Most dot-matrix impact printers use standard continuous-form, edge-perforated **fanfold-paper.** Fanfold paper is usually scored for convenient separation into standard-size sheets following printing. It's available in a variety of weights, sizes, and colors from most office supply stores. Besides plain paper, continuous-form labels, envelopes, accounting forms, and the like are also readily available.

The paper is either **pin-** or **tractor-fed,** which are similar methods. A pair of motor-driven sprockets on a wheel (pin) or treads (tractor) fits into holes on the edges of the paper, and draws it through the machine. This method provides a finer and more positive control of vertical spacing—particularly important for printing graphics—than friction-feed mechanisms.

Also, now that correspondence-quality dot-matrix output is a reality, dot-matrix printers with friction-feed mechanisms are available. This, of course, allows for the use of letterhead paper. On some new models, both friction and tractor feed are standard.

KEY TO CHART

The list of printers in the chart on the opposite page represents a sampling of reasonably priced printers from the major manufacturers in each category. Here's a guide to the criteria we used to evaluate them.

Line Length: Length of normal print line in characters, measured at 10 characters per inch. An 80-character line width is normal for thermal and dot-matrix impact printers using 8½" paper. Compressed fonts may allow up to 132 characters per line at 8½ inches. Letter-quality printers generally accept wider paper, up to 15 inches, and thus print longer lines.

Speed: Printing speed measured in characters per second. Dot-matrix multimode printers may print at varying speeds to provide different print qualities. Speed figures noted for these printers are generally maximum rates in high-speed "DRAFT" mode. Other modal speeds noted where information is available. Average speed for dot-matrix printers is about 80 characters per second in draft mode. Letter-quality printers are slower, averaging from 12 to 40 characters per second.

Feed Type: Paper-handling mechanism. Tractor or pin feed is common on dot-matrix printers; friction feed on thermal and letter-quality.

ABBREVIATIONS:

F—Friction feed. Usually rubber roller. Uses single sheet or roll paper.

T—Tractor feed. Uses edge-perforated fanfold or roll paper. Pair of sprocketed treads pulls paper through machine. Tractor feed provides slightly better grip on paper than similar pin feed.

P—Pin feed. As above but using sprocketed wheels instead of the more secure treads.

P/P—Pin and platen. Combination of pin and friction feed. Platen roller provides support behind paper, which may improve print quality. Uses edge-perforated paper.

Character Matrix: Regards thermal and dot-matrix impact printers only. Size of matrix used to form characters, measured in dots vertical (printhead pins) by dots horizontal. Denser matrix (more dots) means better print quality overall.

Element Type: Letter-quality printers only. Type of print element used and number of characters it contains. Many letter-quality printers use a standard 96-character daisy wheel. Other print element types noted where applicable.

Bidirectional/Logic Seeking: Presence or absence of bidirectional and logic-seeking features. Bidirectional printers are usually faster than printers without this function. Logic-seeking speeds printing of complicated formats, and at the ends of paragraphs.

Font/Pitch: For thermal and dot-matrix printers, standard character sets and pitches are noted. For letter-quality printers, special print functions and pitches are noted.

ABBREVIATIONS:

10, 12, 15, 17—Characters per inch (pitch)
P—Proportional spacing
E—Expanded print
C—Compressed print
S/S—Super/subscripts
SR—Serif style
I—Italic
U#—Number of user-definable fonts available
†—Indicates additional or unusual fonts

Print modes: Styles of printing available

ABBREVIATIONS:

DR—Draft (high speed)
CO—Correspondence ("near letter quality")
DS—Double strike (bold)
LQ—Letter-quality (typewriter quality)

Interface: Standard user interface to connect printer to computer. Multiple or optional interfaces noted.

ABBREVIATIONS:

P or S/Name—Proprietary parallel or serial interface
CPI—Centronics-compatible parallel interface
RS232C—Standard serial interface

25 PRINTERS FOR HOME USE

COMPANY	MODEL	LINE L. @10C/IN.	SPEED (CPS)	FEED TYPE	MTRX. SIZE ELEMENT	GRAPHICS VxH	BD/LS	FONTS/ PITCH	PRINT MODES	INTERFACE	LIST PRICE
THERMAL											
ALPHACOM	81	80	80	F	5 X 7	60X60	NO	10	DR	VARIOUS PLUG-IN	$170
APPLE	SILENTYPE	80	40	F	5 x 7	60X60	NO	10	DR	P/APPLE	$350
STAR MICRONICS	STX-80	80	60	F	9 X 5	62X62	NO	10,E,C,I	DR/DS	CPI/COMM.	$199
TIMEX	2040	40(P.32)	60+	F		64X32	NO	10	DR	P/TIMEX	$100
DOT-MATRIX IMPACT											
COMMODORE	VIC1525P	80	30	T	7 X 6	60X60	NO	10	DR,DS	COMMODORE	$395
EPSON	FX-80	80	160	P/P	9 X 11	72X72 240X216	YES	10,12,P,E,C I,S/S,U2	DR,CO DS	CPI	$699
EPSON	RX-80	80	100	T	9 X 9	72X72 120X216	YES	10,12,E,C,I S/S	DR,CO DS	CPI	$494
FIDELITY	IMPACT	24	30	F	5 X 7	60X60	NO	12,17,21	DR	COMMODORE	$130
IDS	PRISM-80	80	200/110	T F(OP)	9 X 18 9 X 24	Opt.	YES	10,E,C	DR,CO	CPI RS232C OP	$1289
LEADING EDGE	GORILLA	80	50	T	7 X 5	60X63	NO	10,E	DR,DS	CPI	$250
LEADING EDGE	PROWRITER	80	120	P/F	9 X 7	160X44	YES	10,E,C,S/S,I I	CO,DS	CPI RS232C OP	$495
MANNESMANN TALLY	SPIRIT	80	80	F/T	9 X 8	80X80	YES	10,E,C,S/S	DR,CO DS	CPI & RS232C	$399
NEC	P-2	80	180/30	F T(OP)	9 X 18 9 X 23	120X120	YES	10,12,P,C,E S/S,U1	DR,CO LQ	CPI RS232C OP	$799
OKIDATA	92	80	160/40	P/F	9 X 7	72X72	YES	10,E,C,S/S	DR,CO DS	CPI RS232C OP	$699
RADIO SHACK	DMP-120	80	120/30	T/F	9 X 23	100X72	YES	10,12,E,C	DR,DS	CPI COCO SER	$500
SEIKOSHA	GP-100A	80	30	T	7 X 5	60X63	NO	10,E	DR,DS	CPI RS232C OP	$299
TRANSTAR	315 COLOR	80	50	T/F	7 X 5	70X120	NO	10,12,E,C	DR	CPI RS232C OP	$599
LETTER QUALITY											
ATARI	1027	80-12cpi	20	F	BUILT IN		YES	12	LQ,DS	SERIAL	$ 349
BROTHER	HR-15	110	13	F T(OP)	DAISY 96		YES	10,12,15,S/S	LQ,DS	CPI & RS232C	$ 599
DIABLO	620	132	20	F	DAISY 98		YES	10,12,15,P S/S	LQ,DS	RS232C OR P/DIABLO	$1050
LEADING EDGE	STAR	136	40	F/T	DAISY 96	YES	YES	10,12,P,S/S	LQ,DS	RS232C CPI OP	$1895
QUME/ITT	SPRINTII+	132	40	F	DAISY 96		YES	10,12,15,17 P,S/S	LQ,DS	RS232C PLUG COM.	$1776
JUKI	6100	110	18	F	DAISY 100	YES 120X96	YES	10,12,15,P S/S	LQ,DS	CPI RS232 OP	$ 699
SILVER REED	EXP 550	132	16	F	DAISY 96	YES 120X48	YES	10,12,15,P S/S	LQ,DS	CPI	$ 800
SMITH-CORONA	TP-2	105	12	F T(OP)	DAISY 88		NO	10,12	LQ,DS	RS232C CPI OP	$ 795

THE NEWEST "DOTS"

Excellent examples of the new breed of dot-matrix printers are the Mannesmann Tally MT-160L, the new NEC Pinwriter series, and the Okidata 92—all of which produce "near letter-quality" print. Both the Mannesman Tally unit and the Okidata 92 have a top speed of 160 cps and cost less than $800. The NEC Pinwriter-2 ($799) boasts a top speed of 180 cps.

Among the new, low-cost dot-matrix printers are the Epson RX-80 ($494) and the Star Micronics Gemini 10X ($399). Both feature an 80-column-wide line and an emphasized print mode (not as good as "near letter quality"). The Epson prints at 100 cps, while the Gemini 10X is rated at 120 cps.

Even less expensive is Leading Edge's Gorilla Banana printer. It costs only $250 and prints at a respectable 50 cps. The Gorilla accepts fanfold paper.

More and more dot-matrix impact printers also offer graphics features. The GRAFTRAX+ feature available for Epson printers, for example, provides two graphics output modes capable of producing dot images at resolutions of 60 and 120 dots per inch horizontally and as many as 216 dots vertically. This extremely high resolution of the printer means that you can print out, dot for dot, any graphic image from your computer screen. And, it allows you to program the printer to produce even more sophisticated graphics than your computer is capable of displaying. Some dot-matrix printers (such as the IDS Prism-80) even offer the option of printing high-resolution graphics in color.

LETTER-QUALITY PRINTERS

Die-impact printers, usually called "letter quality," offer the most handsome text output available, trading this off against speed, price, and versatility. Because their output is virtually indistinguishable from that of a good typewriter, and because they can handle single sheets of paper with letterheads, letter-quality printers are a necessity for formal correspondence.

In these die-impact printers, individual "dies" for each character are mounted on a small, removable plastic or metal unit—called a daisy wheel, thimble, or ball. This unit fits into or over the printing mechanism, as does the ball on an IBM Selectric typewriter. Because the print elements are removable, it's easy to exchange one character set for another.

Many letter-quality printers use a 96-character daisy wheel, available from several manufacturers in a wide variety of typefaces and pitches. (Pitch refers to the number of characters that can be printed per inch, usually 10, 12, or 15.) Others may use daisy wheels with more or fewer characters.

Other features to check for in a letter-quality printer are **proportional spacing** (which alters the space between characters depending on the size of the character), **boldface** and **shadow** printing, and **subscript** and **superscript** capability, all of which help give printed matter a more sophisticated, typeset appearance. (Superscripts, which are characters above the regular line, are good for footnotes or for mathematical notation, such as X^{10}. Subscripts, which print below the regular line, are most often used in chemical formulas, like H_2O.)

The average speed for daisy-wheel printing hovers around 30 characters per second, falling as low as 12 cps for some models. Speed is often enhanced by bidirectional or logic-seeking features. Nonetheless, printing speeds, especially on letter-quality printers, are incredibly slow in comparison with the rate at which your computer transmits characters to the printer. Unless the printer has as internal memory (some do) sufficient to store a document of reasonable size; or unless you have a **print spooler** or **buffer**—which can store text in the computer or in an external device—you will have to suspend other computer operations during the printing process.

For the frequent user, this can be an annoying waste of time. At 26 characters per second, a 10-page, single-spaced report will take nearly half an hour to print—a long time to sit and watch your computer talk to a printer.

Because they're designed for correspondence—which often means using letterhead stationery—most letter-quality printers use the friction-feed method of paper handling. This allows you to use quality stationery, without perforations on the edges. It also often means you must feed single sheets of paper to the printer one-by-one. This is not particularly covenient, so some die-impact-printer manufacturers offer a **sheet-feeding** device as an option—but seldom, if ever, as a standard feature. These sheet feeders can be expensive, often in the $1,000 range. And most manufacturers offer tractor-feed devices as an option.

THE NEWEST LETTER-QUALITY PRINTERS

The emphasis in the latest generation of letter-quality printers, in addition to lower prices, is on increased versatility. The newest printers sport such features as two-color printing, boldfacing and underlining, multipitch printing (including 25 characters per inch and proportional spacing), easy-to-change daisy wheels and ribbon cassettes, bigger buffers, and bidirectional printing.

Typifying this new breed is the Brother HR-15 (also sold as the Dynax-15 or the Comriter CR-11), listing at $599. Not only does it have all of the above-mentioned features, but it also boasts the least expensive single-sheet feeder ($250). This allows the user to stack up to 200 sheets in a unit that feeds one sheet at a time.

Other new printers in this price category—which is

This is the standard typeface at 10 cpi.
This is italic type
This is double-strike mode.
This is double width
This is the compressed mode.
superscripts and subscripts are easy too!

The typefaces shown here were printed out on an Epson MX-80 dot-matrix printer. Users can switch into any of these modes by keying in a short program from the Epson manual.

extremely reasonable for letter-quality printers—include the Juki 6100, at $699. It uses IBM Selectric ribbons and the popular Triumph Adler daisy wheels, for which replacements are easy to find. The new Smith-Corona TP-II ($895) is an upgraded version of the TP-I, which became popular as a low-cost, highly dependable printer.

INK-JET PRINTERS

The last and smallest printer category features the latest computer print technology: ink-jet printing. In these printers a little nozzle literally squirts ink onto paper to form characters. Olivetti is the first company to bring the cost down to an acceptable level, with its PR-2300 at $560. The quality, although close, does not yet equal that of letter-quality printers.

Olivetti also pioneered in the combination typewriter/letter-quality printer category, with its Olivetti Praxis 30. Now, another company, Ammicro Corp., has added its Microwriter interface to the Praxis 30, and is selling the unit as The Microwriter Olivetti Praxis 30. The Microwriter interface allows connections with IBM PC, TRS-80 Models I, II and III, and Apple II computers, and sells for $680.

PLUGGING IN A PRINTER

Unless you buy a printer that is "plug-compatible" with your computer, you will have to purchase some kind of **interface** (a connecting device) and a special cable to make the connection from the interface to the printer. In some cases, a printer and computer made by the same manufacturer will not connect without a special interface.

Here's a list of points to consider when looking for a printer that will interface with your computer:

1) Printers are linked with computers through either a parallel or a serial interface. A **parallel interface** carries several pieces of information from the computer to a peripheral simultaneously; its multiconductor cable is usually of the "ribbon" variety. A **serial interface** carries only one piece of information at a time; its cable is usually a thick wire.

Because parallel interfaces carry more information at one time, they are faster than serial interfaces. The extra speed is of no particular advantage in printing, as printers are slower than computers; but it is important when storing information in a print buffer.

2) The most common interface for thermal and dot-matrix printers is the **Centronics parallel interface.** If both your printer and your computer are wired for this interface, the hookup is a simple matter of plugging in. If, however, the computer's parallel port is not wired in the Centronics format, you'll have to obtain a special cable to make the connection. These cost about $35, and are available at some printer dealers. If you can't find one there, an electronics shop can make them, if given the specifications.

3) Computers without a built-in parallel port can add one by plugging in an interface device. On Commodore computers, for instance, a special interface will convert its serial port into a parallel port. On an Apple, a parallel printer card can be installed in one of its slots. On the Atari, a plug-in interface (Atari 850) will create a parallel port.

4) Some dot-matrix printers offer a serial interface as an alternative; others offer both. The standard is the **RS-232C serial interface.** Again, this is either built into the computer or added through a plug-in interface, or a special card.

5) Many letter-quality printers use both serial and parallel communications. Some of the more popular models, such as the Qume Sprint series, can be ordered with one or another special interface designed as plug-compatible with a specific computer's serial port. Most, however, require a special cable.

6) Some printers require another type of interface, such as the **IEEE serial interface** for Commodore computers. Commodore's VIC 1525 printer is designed to be plug-compatible with Commodore computers. But, to connect other printers to Commodore computers, you'll need to acquire an IEEE interface.

7) The problem of connecting a printer to a computer cannot be overemphasized. Printers are difficult animals. Make sure, when shopping for a printer, that your dealer is knowledgeable about both the printer and your computer. This could save a lot of legwork. If you find a printer you like, but it comes with, say, a parallel port instead of a serial port, you may find the same printer under a different brand name with a compatible interface.

SOFTWARE COMPATIBILITY

It is important to remember that just because a printer will work with your computer does not necessarily mean that all software for your computer will take full advantage of the printer's capabilities. For instance, your word-processing software might not include the sophisticated print format commands your printer is capable of carrying out. Some of the more expensive software can be configured to make the most of the printer, but this is not always an easy job. In short, try out your favorite software with the printer before you buy.

Conversely, remember that your printer may not support certain special features of your software or computer. The special graphics characters used by some computers, for example, cannot be displayed on many printers—at least not without a special program. You can either write these programs yourself, or, in some cases, buy commercial software. FC

BEFORE YOU BUY A PRINTER,
BE SURE TO TRY IT OUT WITH YOUR
COMPUTER MODEL.
PRINTERS CAN BE DIFFICULT ANIMALS.

How to Build a Printer Muffler for Under $20

BY GENE AND KATIE HAMILTON

Coexisting with the constant clackety-clack-brrrip-brrrip of your printer can be tiresome. You can muffle the little workhorse with this easy-to-construct acoustical cover.

We stifled the sounds of our Smith-Corona printer by as much as 70 percent. The design and construction are so straightforward that anyone can build a custom muffler for his or her own printer.

The muffler is made of foam core art board (found at art supply stores) and held together with inexpensive duct tape (found at hardware stores). The inside is lined with foam weather stripping, also found at hardware stores. A sharp knife and scissors are the only tools you will need.

Our design is simple—just a three-sided box. (The design itself will vary, of course, depending on the shape of your printer.) Foam core board is so light that the cover of the box can be removed with one hand. Because the box is open in the back, air can flow around it and the paper can feed properly. Air circulation is important to keep the printer from overheating. We also incorporated an acrylic window so we could keep an eye out for paper jams.

If you are designing your own muffler, purchase extra foam core board. It is inexpensive, and a few extra sheets will allow for experimentation. Make your cover slightly larger (about half an inch) than the printer. This will allow for easy removal and plenty of air.

SHOPPING LIST

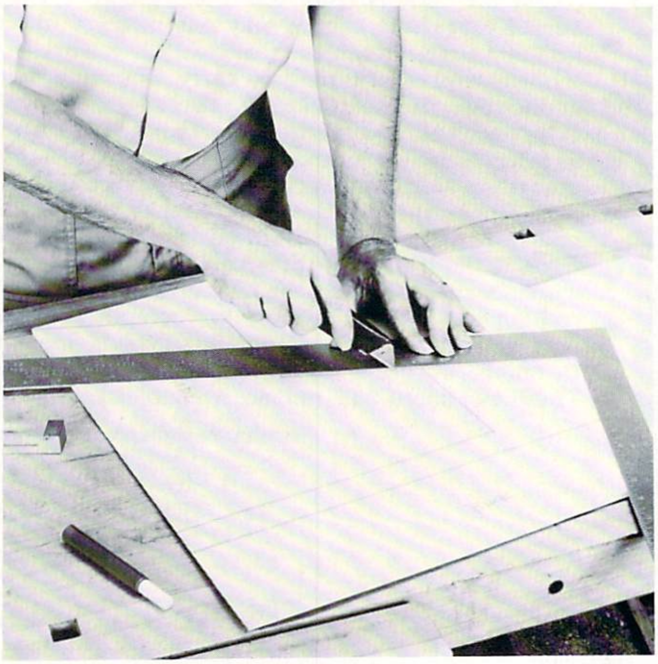
Item	Quantity
20″ × 30″ foam core art board	2
Duct tape roll	1
¾″ foam weather strip rolls	3
⅛″ × 4″ × 20″ acrylic glazing	1
1½″ colored tape (Mystik, Scotch)	2
Spray paint can	1

CUTTING LIST*

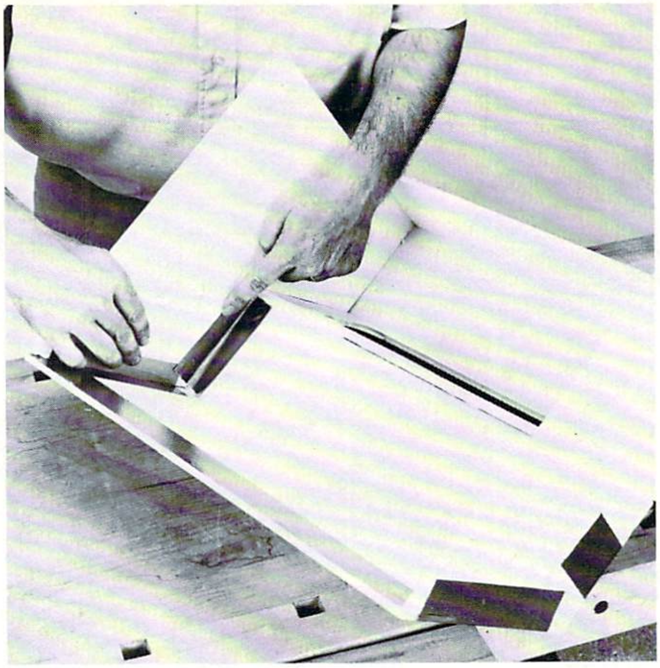
Key	Pcs.	Size & Description
A	2	⅜″ × 11½″ × 15″ foam core board (side)
B	1	⅜″ × 7½″ × 20″ foam core board (front)
C	1	⅜″ × 5″ × 20″ foam core board (shelf)
D	1	⅜″ × 5⅛″ × 20″ foam core board (window frame)
E	1	⅜″ × 4⅞″ × 20″ foam core board (top)
F	1	⅜″ × 4″ × 20″ foam core board (back)
G	1	⅛″ × 4″ × 20″ Acrylic glazing (window)

**This list applies only to the acoustical cover shown here, designed for the Smith Corona TP-1.*

The Hamiltons' last article for FAMILY COMPUTING *was "How to Build a Compact Computer Console for $25," in the Premier issue.*

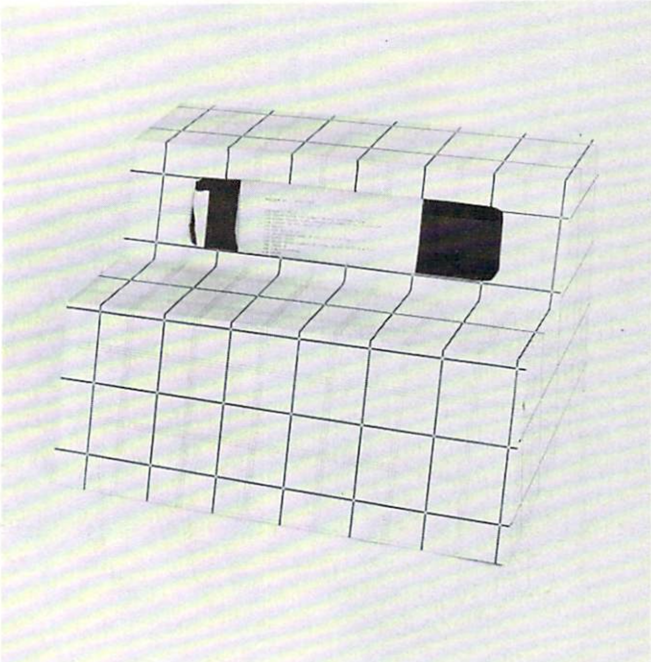


1. Construction is simple and cheap. We spent $16.75. Here's how to build it. Outline the parts on the foam board with a marker and cut them out with a sharp knife. A metal straight edge helps keep cuts even.



2. Assemble the cover with small pieces of duct tape on the outside (just a temporary holding device) and then apply full-size tape strips to the inside seams.

3. Cut the self-adhesive foam weather stripping to length and press it into place. We found it unnecessary to cover the entire inside surface with foam. Space the strips about one inch apart. Try your cover and add more sound absorbing foam if necessary.

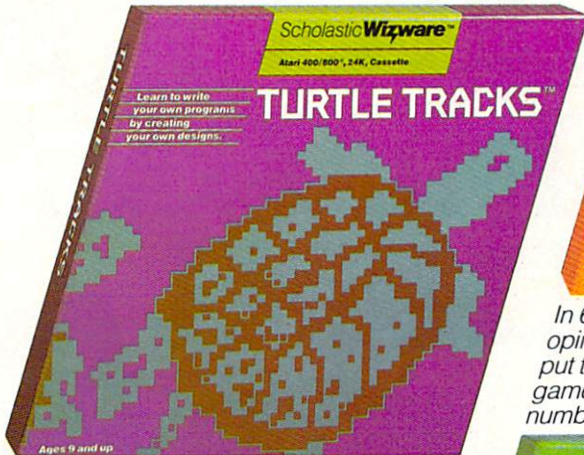


4. You can decorate your muffler with contact paper, wallpaper, fabric, or spray paint. We covered ours with contact paper. If you paint, cover the outside seams with a colored tape to add strength.

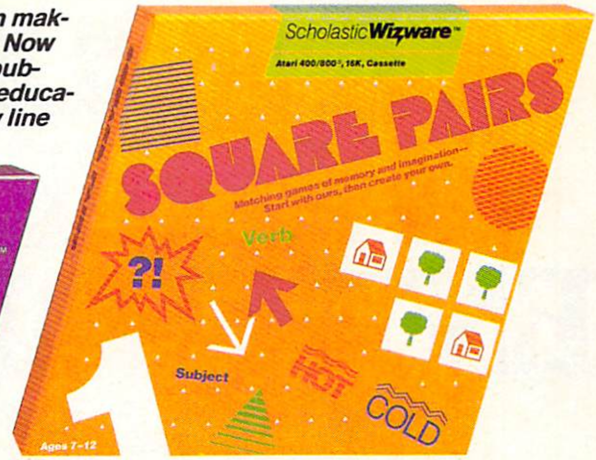
5. The window is cut from a scrap of acrylic glazing, available at hardware stores or lumber yards. The store will cut it to size for you or you can use a sharp knife. Tape it in place from the back with masking tape. FC

We're always thinking about helping kids think.

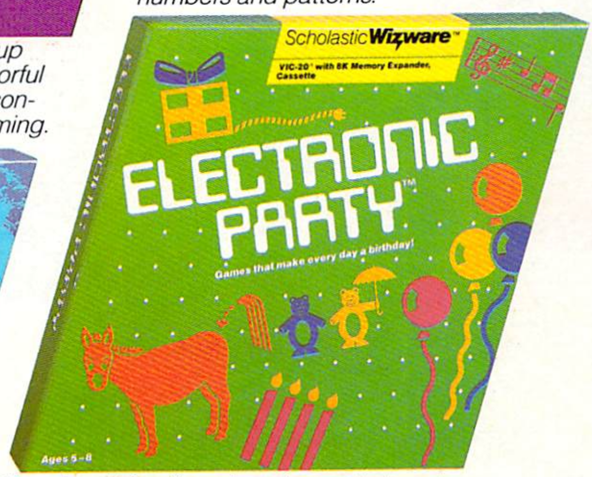
You know Scholastic. We've been making learning fun for over 60 years. Now this leading name in educational publishing takes the lead in computer education. Now we make Wizware™, a new line of microcomputer software.



With Turtle Tracks,™ youngsters 9 and up have endless hours of fun creating colorful computer graphics, while learning reasoning skills and the principles of programming.



In 60 years we've learned a lot about developing kids' reasoning and math skills. We've put this know-how into Square Pairs,™ a game in which children 5 to 8 match words, numbers and patterns.



There's nothing like a learning party to get kids excited about education. That's the idea behind Electronic Party,™ a maze game in which children 5 to 8 also create original computer graphics.

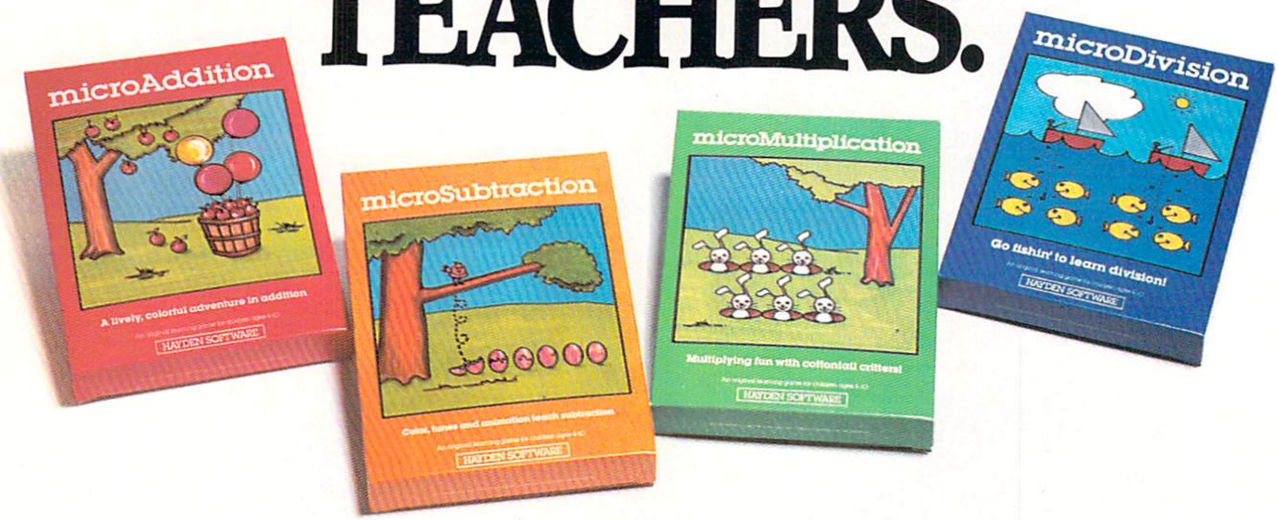
Microzine™ is an innovation in computer education—a programmed magazine that kids read, "talk" to and help write. It stimulates creativity in children 10 and up.*

Scholastic Wizware™ is compatible with Apple,® Atari,® TI-99/4A, VIC-20,® Commodore 64,® and IBM® PC.

Scholastic Wizware™

**Graphics created with Penguin Software's Graphics Magician. Apple is a registered trademark of Apple Computer, Inc. Atari is a registered trademark of Atari Division, Warner Communications, Inc. VIC-20 and 64 are registered trademarks of Commodore Electronics Ltd. IBM is a registered trademark of International Business Machines Corp.*

INTRODUCING 4 OF AMERICA'S MOST ENTERTAINING MATH TEACHERS.



Buy two or more microMath games and get free Fisher-Price toys.

The four microMath learning games from Hayden Software really motivate your children to learn math. Each microMath game has plenty of animation, color and tunes to keep your kids fascinated for hours.

They'll learn division from a school of fish, multiplication from rabbits, subtraction from birds and addition from balloons and apples.

Older children will also find microMath is a wonderful way to improve their math skills because each game offers increasingly difficult exercises.

Each microMath game offers a child four options—an introduction to numbers, the values of numbers, the particular math function and a quiz. It even has a built-in calculator. Everything children need to learn math at their own pace.

And microMath games can be played on Apple IIe, Atari, Commodore 64 and popular compatibles.

How to get your free toys.

Right now, we're giving you a little extra incentive to buy microMath. Free toys from Fisher-Price.

Here's how it works. Just buy any two microMath programs and we'll send you one of the smaller vehicles with its driver. Buy three programs and you'll receive the Mini Bus complete with driver, family, and dog. Buy the complete microMath series and we'll give you the School Bus.

For more information on this great deal, see your Hayden Software dealer soon.

microMath

HAYDEN SOFTWARE

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See your local dealer or call 1-800-343-1218.

the Programmer

★ N O V E M B E R ★

ILLUSTRATIONS BY/JIM CHERRY III

FAMILY VOTING BOOTH

BY JOEY LATIMER

Turn your computer into a *Family Voting Booth* this November, but remember: The ballots don't remain secret, and that's what makes this program a winner! Your family can select any question it wishes to vote on. The computer will ask you not only for your choice but also for your guesses about how the other members of your family will vote. Perceptiveness is the real winner in this election. Think carefully: Your answers will be displayed at the end. (You can then choose to vote on a new question with the same people, or to run the program again with a different group of voters, if you like.)

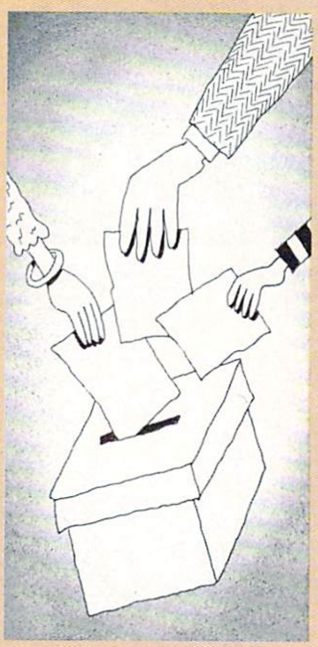

ILLUSTRATION BY JOSHUA GOSFIELD

Base Version (TRS-80s & IBM PC)/ *Family Voting Booth*

```
10 DIM C$(15),C(15)
30 CLEAR 1000
40 CLS
50 PRINT "-FAMILY VOTING BOOTH-"
60 PRINT
70 PRINT "HOW MANY ARE VOTING";
80 INPUT N
90 DIM V$(N),V(N,N),G(N)
120 FOR X = 1 TO N
130 PRINT "WHO IS VOTER #"; X
140 INPUT V$(X)
170 NEXT X
180 CLS
190 PRINT "WHAT QUESTION WILL YOU BE VOTING O
N"
200 INPUT Q$
210 PRINT "HOW MANY CHOICES (UP TO 10) ARE TH
ERE"
220 INPUT P
230 H = P
240 M = 0
250 FOR X = 1 TO P
260 PRINT "CHOICE #"; X;
270 INPUT C$(X)
300 C(X) = 0
310 NEXT X
320 FOR X = 1 TO N
330 CLS
340 PRINT "VOTER #"; X; " IS "; V$(X); "."
350 FOR Y = 1 TO 1000
360 NEXT Y
370 PRINT
380 PRINT "HI, "; V$(X); "!"
390 PRINT "THE QUESTION IS"
400 PRINT
410 PRINT Q$
420 PRINT
430 PRINT "THE CHOICES ARE"
440 FOR Y = 1 TO P
450 PRINT Y; " - "; C$(Y)
460 NEXT Y
470 PRINT
480 PRINT "CHOOSE A NUMBER"
490 GOSUB 2000
500 V(X,X) = I
510 C(I) = C(I) + 1
520 IF C(I) < M THEN 540
530 M = C(I)
540 FOR Y = 1 TO N
550 IF Y = X THEN 590
560 PRINT "WHAT WOULD "; V$(Y); " CHOOSE"
570 GOSUB 2000
580 V(X,Y) = I
590 NEXT Y
600 NEXT X
610 CLS
620 PRINT "HERE IS HOW THE VOTES WENT:"
630 PRINT
640 W$ = ""
650 FOR X = 1 TO P
660 PRINT C$(X); " GOT"; C(X); "VOTE(S)."
670 IF C(X) < M THEN 700
680 W$ = W$ + C$(X) + " ..."
700 NEXT X
710 PRINT
720 PRINT "THE FOLLOWING GOT THE MOST VOTES:"
730 PRINT W$
740 GOSUB 3000
750 FOR X = 1 TO N
760 PRINT V$(X); " CHOSE "; C$(V(X,X)); "."
770 NEXT X
780 GOSUB 3000
790 W = 0
800 FOR X = 1 TO N
810 PRINT V$(X); " THOUGHT ..."
820 G(X) = 0
830 FOR Y = 1 TO N
840 IF X = Y THEN 870
850 PRINT " "; V$(Y); " WOULD CHOOSE "; C$(V(
X,Y))
860 G(X) = G(X) - (V(X,Y) = V(Y,Y))
870 NEXT Y
880 PRINT
890 PRINT "OF"; N-1; "GUESS(ES), "; V$(X); "
GOT"; G(X); "CORRECT."
900 IF G(X) < W THEN 920
910 W = G(X)
920 GOSUB 3000
930 NEXT X
940 PRINT "THE FOLLOWING MADE THE"
950 PRINT "MOST CORRECT GUESSES:"
960 FOR X = 1 TO N
970 IF G(X) < W THEN 990
980 PRINT V$(X); " ..."
990 NEXT X
1000 GOSUB 3000
1010 PRINT "PLEASE CHOOSE ONE OF THE FOLLOWIN
G:"
1020 PRINT " 1-TO QUIT;"
1030 PRINT " 2-TO SEE THE RESULTS AGAIN;"
1040 PRINT " 3-TO VOTE ON A NEW QUESTION;"
1050 PRINT " 4-TO RUN THE PROGRAM AGAIN."
1060 PRINT "ENTER 1-4"
1070 H = 4
1080 GOSUB 2000
1090 ON I GOTO 1130,610,180,1140
1130 END
1140 RUN
2000 INPUT I$
2010 I = VAL(I$)
2020 IF I < 1 OR I > H THEN 2050
2040 RETURN
2050 PRINT "THERE IS NO CHOICE #"; I$; "."
2060 PRINT "CHOOSE A NUMBER FROM 1 TO"; H;
2070 GOTO 2000
3000 PRINT
3010 PRINT "PRESS ENTER...";
3020 INPUT I$
3030 CLS
3040 RETURN
```

Atari/*Family Voting Booth*

```
10 DIM C$(150),C(10),CL(10),I$(15),Q$(38),V$(
150),VL(10),V(10,10),W$(100),G(10)
40 PRINT CHR$(125);
50 PRINT "-FAMILY VOTING BOOTH-"
60 PRINT
70 PRINT "HOW MANY ARE VOTING";
80 INPUT N
120 FOR X=1 TO N
130 PRINT "WHO IS VOTER #";X
140 INPUT I$
150 VL(X)=LEN(I$)+X*15-15
160 V$(X*15-14,VL(X))=I$
170 NEXT X
180 PRINT CHR$(125)
190 PRINT "WHAT QUESTION WILL YOU BE VOTING O
N?"
200 INPUT Q$
210 PRINT "HOW MANY CHOICES (UP TO 10) ARE TH
ERE";
220 INPUT P
230 H=P
240 M=0
250 FOR X=1 TO P
260 PRINT "CHOICE #";X;
270 INPUT I$
280 CL(X)=LEN(I$)+X*15-15
290 C$(X*15-14,CL(X))=I$
300 C(X)=0
310 NEXT X
320 FOR X=1 TO N
330 PRINT CHR$(125)
340 PRINT "VOTER #";X;" IS ";V$(X*15-14,VL(X))
350 FOR Y=1 TO 1000
360 NEXT Y
370 PRINT
380 PRINT "HI, ";V$(X*15-14,VL(X));"!"
390 PRINT "THE QUESTION IS"
400 PRINT
410 PRINT Q$
420 PRINT
430 PRINT "THE CHOICES ARE"
440 FOR Y=1 TO P
450 PRINT Y;"-";C$(Y*15-14,CL(Y))
460 NEXT Y
470 PRINT
480 PRINT "CHOOSE A NUMBER";
490 GOSUB 2000
500 V(X,X)=I
510 C(I)=C(I)+1
520 IF C(I)<M THEN 540
530 M=C(I)
540 FOR Y=1 TO N
550 IF Y=X THEN 590
560 PRINT "WHAT WOULD ";V$(Y*15-14,VL(Y));" C
HOOSE";
570 GOSUB 2000
580 V(X,Y)=I
590 NEXT Y
600 NEXT X
610 PRINT CHR$(125)
620 PRINT "HERE IS HOW THE VOTES WENT:"
630 PRINT
640 W$=""
650 FOR X=1 TO P
660 PRINT C$(X*15-14,CL(X));" GOT ";C(X);" VO
TE(S):"
670 IF C(X)<M THEN 700
680 W$(LEN(W$)+1)=C$(X*15-14,CL(X))
690 W$(LEN(W$)+1)=" ..."
700 NEXT X
710 PRINT
720 PRINT "THE FOLLOWING GOT THE MOST VOTES:"
730 PRINT W$
740 GOSUB 3000
750 FOR X=1 TO N
760 PRINT V$(X*15-14,VL(X));" CHOSE ";C$(V(X,
X)*15-14,CL(V(X,X)))
770 NEXT X
780 GOSUB 3000
790 W=0
800 FOR X=1 TO N
810 PRINT V$(X*15-14,VL(X));" THOUGHT..."
820 G(X)=0
830 FOR Y=1 TO N
840 IF X=Y THEN 870
850 PRINT " ";V$(Y*15-14,VL(Y));" WOULD CHOOS
E ";C$(V(X,Y)*15-14,CL(V(X,Y)))
860 G(X)=G(X)+(V(X,Y)=V(Y,Y))
870 NEXT Y
880 PRINT
890 PRINT "OF ";N-1;" GUESS(ES), ";V$(X*15-14
,VL(X));" GOT ";G(X);" CORRECT."
900 IF G(X)<W THEN 920
910 W=G(X)
920 GOSUB 3000
930 NEXT X
940 PRINT "THE FOLLOWING MADE THE"
950 PRINT "MOST CORRECT GUESSES:"
960 FOR X=1 TO N
970 IF G(X)<W THEN 990
980 PRINT V$(X*15-14,VL(X));" ..."
990 NEXT X
1000 GOSUB 3000
1010 PRINT "PLEASE CHOOSE ONE OF THE FOLLOWIN
G:"
1020 PRINT " 1-QUIT;"
1030 PRINT " 2-TO SEE THE RESULTS AGAIN;"
1040 PRINT " 3-TO VOTE ON A NEW QUESTION;"
1050 PRINT " 4-TO RUN THE PROGRAM AGAIN"
1060 PRINT "ENTER 1-4";
1070 H=4
1080 GOSUB 2000
1090 ON I GOTO 1130,610,180,1140
1130 END
1140 RUN
2000 INPUT I$
2010 I=VAL(I$)
2020 IF I<1 OR I>H THEN 2040
2030 RETURN
2040 PRINT "THERE IS NO CHOICE #";I$;"."
2050 PRINT "CHOOSE A NUMBER FROM 1 TO ";H;
2060 GOTO 2000
3000 PRINT
3010 PRINT "PRESS RETURN...";
3020 INPUT I$
3030 PRINT CHR$(125)
3040 RETURN
```

MODIFICATIONS FOR OTHER COMPUTERS

Apple/*Family Voting Booth*

Use the base version, except change `CLS` in lines 40, 180, 330, 610, and 3030 to `HOME`, omit line 30, and change lines 660, 860, 890, and 2060 to read

```
660 PRINT C$(X); " GOT "; C(X); " VOTE(S)."
860 G(X) = G(X) + (V(X,Y) = V(Y,Y))
890 PRINT "OF "; N - 1; " GUESSES, "; V$(X);
 " GOT "; G(X); " CORRECT."
2060 PRINT "CHOOSE A NUMBER FROM 1 TO "; H;
```

Commodore 64 & VIC-20 with Memory Expander/ *Family Voting Booth*

Omit line 30 of the base version; also, change `CLS` in lines 40, 180, 330, 610, and 3030 to read

```
PRINT CHR$(147)
```

TI-99/4A/*Family Voting Booth*

Change lines 680 and 1140 of the base version to read

```
680 W$ = W$ & C$(X) & " ..."
1140 GOTO 10
```

Also, change `CLS` in lines 40, 180, 330, 610, and 3030 to read `CALL CLEAR`

Finally, omit lines 30 and 90 and add the following as line 20: `20 DIM V$(10),V(10,10),G(10)`

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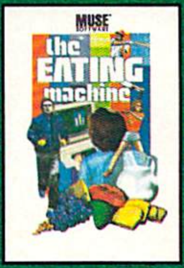

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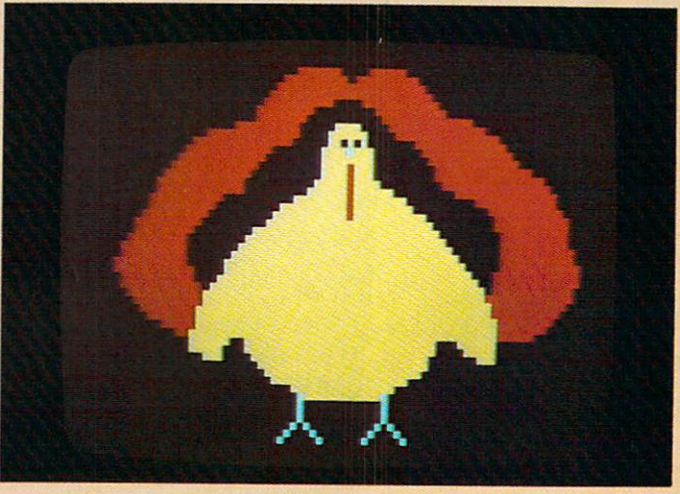
TURKEY

BY JOEY LATIMER

When the relatives arrive at your house on Thanksgiving Day to the sweet aroma of a cooking turkey, keep them out of your way in the kitchen. Set up your computer with a totally different kind of *Turkey* for them to feast their eyes on.

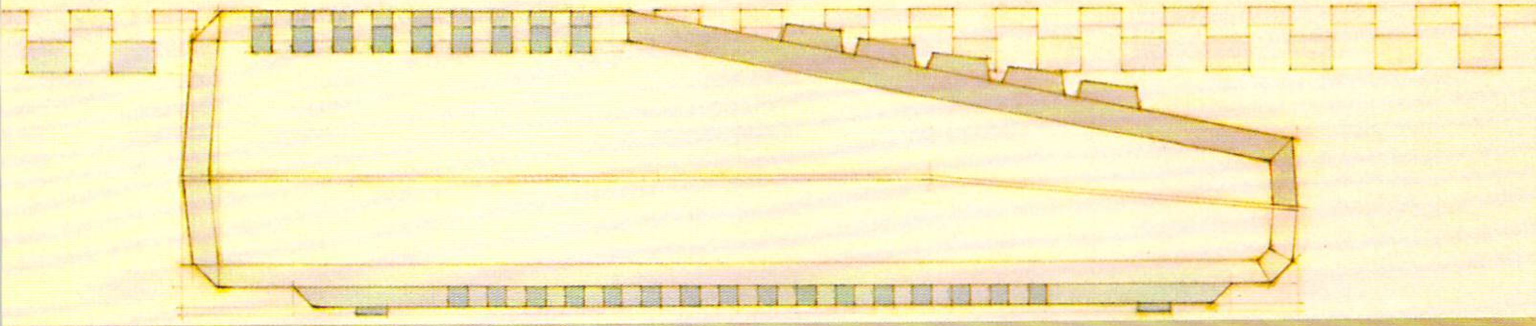


Apple/*Turkey*

```
10 HOME
20 GR
30 COLOR= 15
40 FOR Z = 0 TO 39
50 HLIN 0,39 AT Z
60 NEXT Z
70 COLOR= 0
80 HLIN 14,18 AT 1
90 FOR Z = 1 TO 25
100 READ X,Y
110 HLIN X,Y AT Z
120 NEXT Z
130 COLOR= 9
140 HLIN 16,18 AT 3
150 FOR Z = 3 TO 21
160 READ X,Y
170 HLIN X,Y AT Z
180 NEXT Z
190 COLOR= 8
200 FOR Z = 19 TO 27
210 READ X,Y
220 HLIN X,Y AT Z
230 READ X,Y
240 HLIN X,Y AT Z
250 NEXT Z
260 COLOR= 8
270 FOR Z = 6 TO 32
280 READ X,Y
290 HLIN X,Y AT Z
300 NEXT Z
310 COLOR= 13
320 VLIN 32,35 AT 16
330 VLIN 32,35 AT 23
340 PLOT 15,36
350 PLOT 17,36
360 PLOT 22,36
370 PLOT 24,36
380 PLOT 14,37
390 PLOT 18,37
400 PLOT 21,37
410 PLOT 25,37
420 COLOR= 7
430 PLOT 18,9
440 PLOT 20,9
450 COLOR= 13
460 PLOT 19,10
470 COLOR= 9
480 VLIN 12,15 AT 19
490 GOTO 490
1000 DATA  14,24,12,26,9,29,9,29,8,30,7,32,7
1010 DATA  33,7,34,5,34,3,36,2,37,1,38,1,39,0
1020 DATA  39,0,39,0,39,0,39,0,39,0,39,1,38,2
1030 DATA  37,3,36,4,35,5,34,6,33,20,22,15,26
1040 DATA  15,27,14,28,11,28,10,31,10,31,9,31
1050 DATA  8,32,6,33,6,33,5,34,5,34,6,33,6,32
1060 DATA  7,32,7,31,7,31,8,31,9,10,27,28,8,9
1070 DATA  28,29,7,9,28,30,7,9,28,30,6,9,28
1080 DATA  31,5,9,28,32,5,9,28,32,5,8,29,32,6
1090 DATA  7,30,31,18,20,17,21,17,21,17,21,17
1100 DATA  21,17,21,16,22,15,23,14,24,13,25
1110 DATA  12,26,11,27,10,27,10,27,10,27,10
1120 DATA  27,10,27,10,27,10,27,10,27,11,26
1130 DATA  11,26,12,25,12,25,13,24,15,23,17
1140 DATA  22
```

Atari/*Turkey*

```
10 GRAPHICS 5+16
20 SETCOLOR 2,3,3
30 READ C,N
40 IF C=999 THEN 40
50 COLOR C
60 FOR Z=1 TO N
70 READ X,Y,A,B
80 PLOT X,Y
90 DRAWTO A,B
100 NEXT Z
110 GOTO 30
1000 DATA 3,36,32,0,38,0,43,0,48,0,30,1,39,1
1010 DATA 41,1,50,1,29,2,51,2,28,3,52,3,27,4
1020 DATA 53,4,26,5,54,5,26,6,58,6,23,7,60,7
1030 DATA 19,8,62,8,17,9,63,9,16,10,64,10,15
1040 DATA 11,65,11,14,12,67,12,13,13,69,13,12
1050 DATA 14,70,14,12,15,71,15,11,16,71,16,11
1060 DATA 17,72,17,10,18,73,18,9,19,73,19,9
1070 DATA 20,73,20,8,21,73,21,7,22,74,22,7,23
1080 DATA 74,23,6,24,75,24,6,25,75,25,7,26,75
1090 DATA 26,7,27,74,27,8,28,74,28,9,29,73,29
1100 DATA 10,30,72,30,11,31,71,31,13,32,70,32
1110 DATA 15,33,68,33,0,24,38,4,41,4,35,5,43
1120 DATA 5,34,6,44,6,33,7,45,7,33,8,46,8,32
1130 DATA 9,49,9,29,10,50,10,28,11,51,11,27
1140 DATA 12,52,12,26,13,52,13,25,14,53,14,25
1150 DATA 15,55,15,22,16,58,16,21,17,60,17,20
1160 DATA 18,61,18,19,19,61,19,18,20,62,20,17
1170 DATA 21,62,21,17,22,62,22,17,23,62,23,17
1180 DATA 24,62,24,18,25,61,25,18,26,61,26,19
1190 DATA 27,61,27,1,41,38,7,41,7,37,8,42,8
1200 DATA 37,9,42,9,36,10,43,10,36,11,43,11
1210 DATA 36,12,43,12,36,13,43,13,35,14,44,14
1220 DATA 34,15,46,15,32,16,48,16,30,17,49,17
1230 DATA 29,18,51,18,28,19,52,19,26,20,53,20
1240 DATA 25,21,54,21,24,22,55,22,23,23,56,23
1250 DATA 22,24,57,24,22,25,58,25,21,26,59,26
1260 DATA 20,27,60,27,19,28,60,28,19,29,61,29
1270 DATA 18,30,61,30,18,31,62,31,18,32,62,32
1280 DATA 17,33,62,33,17,34,22,34,25,34,53,34
1290 DATA 57,34,62,34,17,35,21,35,25,35,53,35
1300 DATA 58,35,62,35,19,36,21,36,26,36,52,36
1310 DATA 60,36,62,36,27,37,52,37,28,38,51,38
1320 DATA 29,39,49,39,32,40,47,40,33,41,46,41
1330 DATA 2,7,33,41,33,44,46,41,46,44,32,45
1340 DATA 30,47,34,45,36,47,45,45,43,47,47,45
1350 DATA 49,47,40,10,40,10,0,2,39,9,39,9,41
1360 DATA 9,41,9,3,1,40,12,40,18,999,999
```



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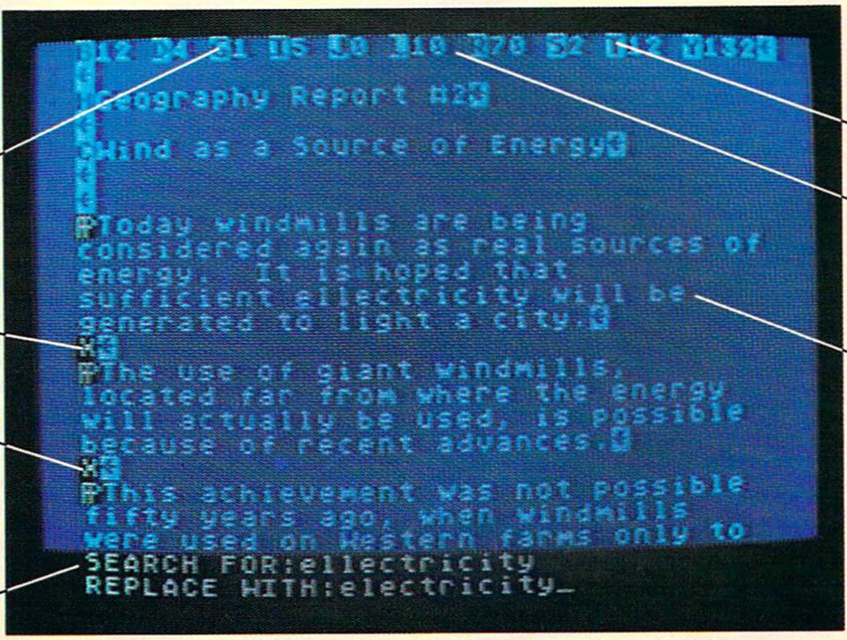

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Commodore 64/*Turkey*

```
10 PRINT CHR$(147)
20 POKE 53280,1
30 POKE 53281,1
40 READ B,CH,CO
50 IF B=0 THEN 50
60 FOR Z=1 TO B
70 READ X,Y
80 FOR P=X TO Y
90 POKE P,CH
100 POKE P+54272,CO
110 NEXT P
120 NEXT Z
130 GOTO 40
1000 DATA 17,73,0,1040,1043,1046,1050,1079
1010 DATA 1091,1116,1131,1155,1174,1194,1215
1020 DATA 1234,1255,1271,1295,1310,1335,1349
1030 DATA 1376,1388,1418,1428,1459,1468,1499
1040 DATA 1508,1539,1549,1578,1590,1616,1631
1050 DATA 1654,15,74,8,1121,1122,1124,1125
1060 DATA 1160,1169,1199,1210,1236,1250,1276
1070 DATA 1291,1315,1333,1353,1375,1393,1413
1080 DATA 1433,1453,1473,1493,1514,1534,1554
1090 DATA 1574,1613,1614,1653,1653,9,21,10
1100 DATA 1516,1530,1555,1571,1594,1612,1633
1110 DATA 1652,1673,1693,1713,1715,1731,1733
1120 DATA 1753,1754,1772,1773,17,160,9,1202
1130 DATA 1204,1241,1245,1281,1285,1321,1325
1140 DATA 1361,1365,1399,1406,1438,1448,1477
1150 DATA 1489,1516,1530,1556,1570,1596,1610
1160 DATA 1636,1650,1676,1690,1717,1729,1757
1170 DATA 1769,1798,1808,1839,1848,12,90,7
1180 DATA 1880,1880,1920,1920,1927,1927,1887
1190 DATA 1887,1959,1959,1961,1961,1966,1966
1200 DATA 1968,1968,1998,1998,2002,2002,2005
1210 DATA 2005,2009,2009,3,83,2,1363,1363
1220 DATA 1403,1403,1443,1443,2,87,6,1282
1230 DATA 1282,1284,1284,1,22,7,1323,1323
1240 DATA 0,0,0
```

VIC-20/*Turkey*

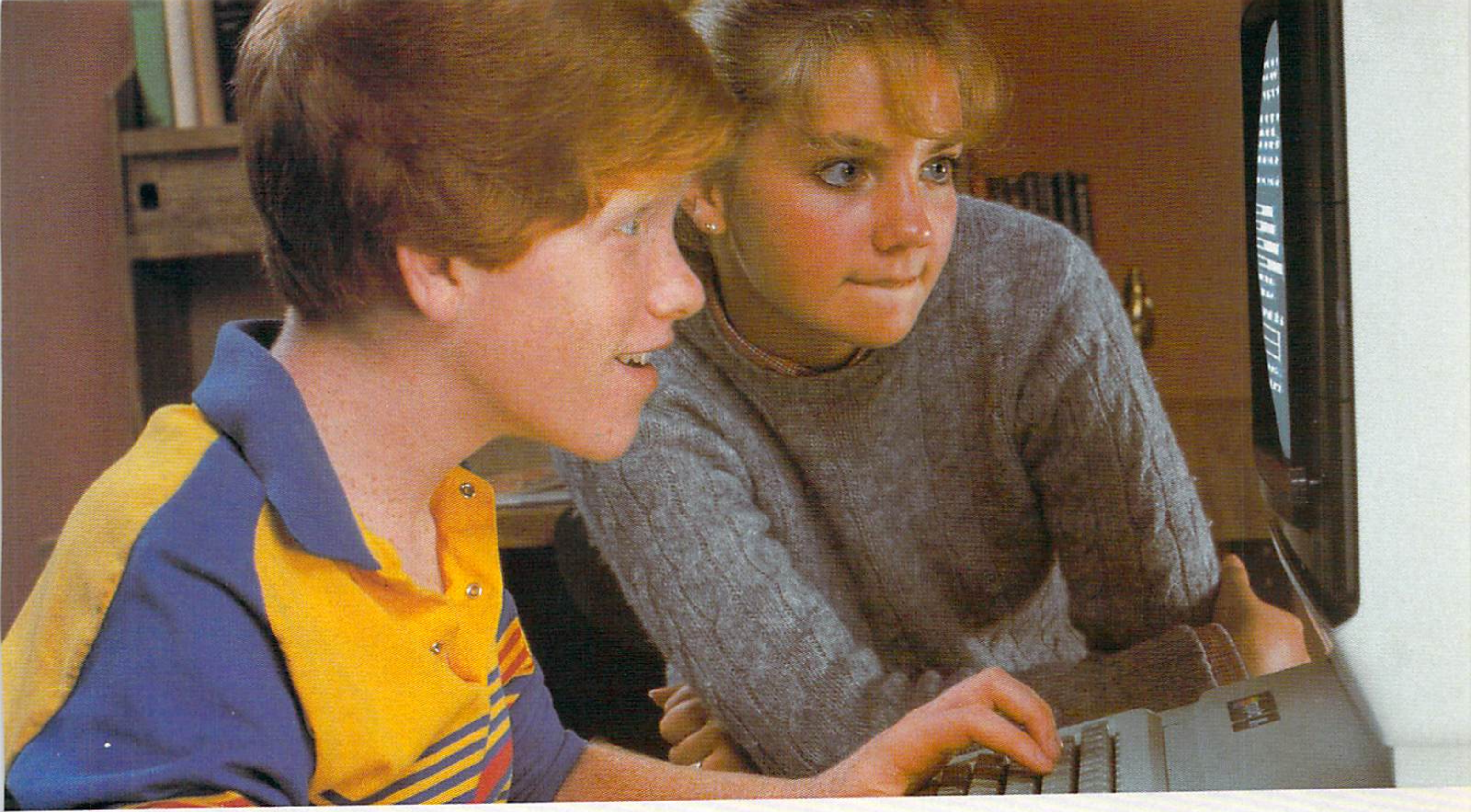
```
10 PRINT CHR$(147)
20 READ B,CH,CO
30 IF B=0 THEN 30
40 FOR Z=1 TO B
50 READ X,Y
60 FOR P=X TO Y
70 POKE P,CH
80 POKE P+30720,CO
90 NEXT P
100 NEXT Z
110 GOTO 20
1000 DATA 15,0,0,7689,7694,7707,7719,7728,7742
1010 DATA 7749,7765,7770,7788,7792,7810,7813
1020 DATA 7832,7835,7855,7857,7877,7878,7899
1030 DATA 7900,7921,7922,7943,7944,7964,7966
1040 DATA 7986,7989,8008,11,28,2,7733,7735
1050 DATA 7753,7760,7774,7783,7796,7806,7817
1060 DATA 7829,7839,7851,7860,7874,7881,7897
1070 DATA 7902,7919,7924,7940,7946,7962,7,22,2
1080 DATA 7969,7983,7990,8006,8012,8028,8033
1090 DATA 8051,8055,8073,8078,8079,8093,8094
1100 DATA 16,160,2,7799,7801,7820,7824,7842
1110 DATA 7846,7864,7868,7885,7891,7906,7914
1120 DATA 7927,7937,7948,7960,7970,7982,7992
1130 DATA 8004,8014,8026,8036,8048,8058,8070
1140 DATA 8081,8091,8104,8112,8128,8132,6,90,7
1150 DATA 8150,8150,8154,8154,8171,8171,8173
1160 DATA 8173,8175,8175,8177,8177,1,22,7,7844
1170 DATA 7844,2,15,6,7821,7821,7823,7823,3,83
1180 DATA 2,7866,7866,7888,7888,7910,7910
1190 DATA 0,0,0
```

IBM PC/*Turkey*

```
10 KEY OFF
20 CLS
30 READ N,C
40 IF N = 999 THEN 130
50 FOR I = 1 TO N
60 READ Y,B,E
70 FOR X = B TO E
80 LOCATE Y,X
90 PRINT CHR$(C)
100 NEXT X
110 NEXT I
120 GOTO 30
130 READ Y,X,C
140 LOCATE Y,X
150 PRINT CHR$(C);
160 IF X = 45 THEN 160
170 GOTO 130
1000 DATA 19,40,1,33,38,1,42,47,2,30,50,3,29
1010 DATA 51,4,28,52,5,25,55,6,24,56,7,23,57
1020 DATA 8,21,59,9,20,60,10,19,61,11,18,62
1030 DATA 12,18,62,13,17,63,14,16,64,15,16,64
1040 DATA 16,17,63,17,18,62,18,21,59,14,117,3
1050 DATA 35,45,4,34,46,5,32,48,6,32,48,7,29
1060 DATA 51,8,28,52,9,26,54,10,25,55,11,24
1070 DATA 56,12,23,57,13,23,57,14,23,57,15,23
1080 DATA 57,16,24,56,22,73,4,38,42,5,37,43,6
1090 DATA 37,43,7,37,43,8,36,44,9,34,46,10,32
1100 DATA 48,11,31,49,12,30,50,13,28,52,14,27
1110 DATA 53,15,27,53,16,26,54,17,25,55,18,25
1120 DATA 55,19,25,29,19,32,48,19,51,55,20,25
1130 DATA 28,20,33,47,20,52,55,21,34,46,999
1140 DATA 999,5,39,111,5,40,0,5,41,111,6,40
1150 DATA 94,7,40,94,8,40,94,9,40,94,22,36,88
1160 DATA 22,44,88,23,36,88,23,44,88,24,35,88
1170 DATA 24,37,88,24,43,88,24,45,88
```

TI-99/4A/*Turkey*

```
10 CALL CLEAR
20 CALL SCREEN(2)
30 READ CS,CHAR,F,B
40 IF CS=0 THEN 120
50 CALL COLOR(CS,F,B)
60 READ X,Y
70 FOR COLUMN=X TO Y
80 READ ROW,REP
90 CALL VCHAR(ROW,COLUMN,CHAR,REP)
100 NEXT COLUMN
110 GOTO 30
120 CALL COLOR(6,16,6)
130 CALL HCHAR(7,15,79,1)
140 CALL HCHAR(7,17,79,1)
150 CALL COLOR(7,12,7)
160 CALL HCHAR(8,16,86,1)
170 CALL COLOR(11,10,7)
180 FOR ROW=9 TO 11
190 CALL VCHAR(ROW,16,118,3)
200 NEXT ROW
210 GOTO 210
1000 DATA 2,40,7,1,1,32,10,4,9,6,8,8,7,10,7
1010 DATA 10,5,11,4,5,3,5,3,3,3,3,2,4,2,3,2,2
1020 DATA 1,2,1,2,1,2,1,2,1,2,1,3,1,3,2,2,2,2
1030 DATA 2,3,3,4,4,3,4,12,5,12,5,11,8,8,10,5
1040 DATA 10,5,11,3,12,125,12,1,6,27,9,4,9,6
1050 DATA 8,6,6,7,6,6,6,5,5,5,4,6,3,3,3,2,3,2
1060 DATA 3,2,3,3,4,6,4,6,4,7,4,8,5,8,7,7,7,8
1070 DATA 8,6,9,4,7,85,15,1,6,9,16,4,15,5,14
1080 DATA 5,13,5,7,85,15,1,23,26,13,5,14,5,14
1090 DATA 6,16,4,9,96,7,7,10,22,12,8,11,10,10
1100 DATA 12,10,12,6,16,5,17,5,17,5,17,6,16
1110 DATA 10,12,10,12,11,10,12,8,8,94,12,1,12
1120 DATA 14,24,1,22,2,24,1,8,94,12,1,18,20
1130 DATA 24,1,22,2,24,1,0,0,0,0
```



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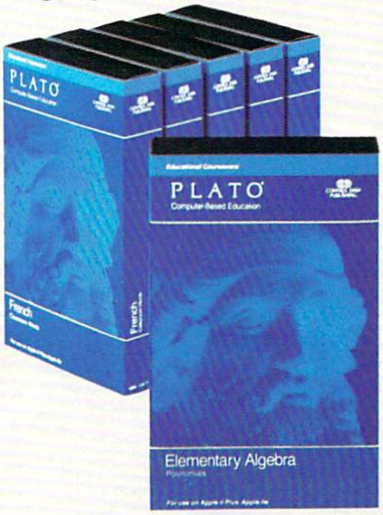

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PLATO
COMPUTER-BASED EDUCATION

CONTROL DATA PUBLISHING

Timex Sinclair 1000/*Turkey*

```
 10 LET YY = 8.6
 20 LET XX = 15
 30 LET I = 16
 40 LET B = 9
 50 LET A = 12
 60 GOSUB 320
 70 LET XX = 15
 80 LET I = 27
 90 LET B = 8
100 LET A = 7
110 GOSUB 320
120 LET XX = 15
130 LET YY = 7.7
140 LET I = 8
150 LET A = 2.7
160 LET B = 3.4
170 GOSUB 320
180 LET YY = 14
190 LET A = 5.4
200 LET B = 5.4
210 GOSUB 320
220 PRINT AT 12,10; CHR$ 27; AT 17,20; CHR$ 8
230 PRINT AT 19,18; CHR$ 8; AT 20,13; "I"
240 PRINT AT 20,17; "I"; AT 8,12; "."
250 PRINT AT 7,12; "."; AT 5,13; "."
260 PRINT AT 4,15; "."; AT 7,14; "*"
270 PRINT AT 7,16; "*"; AT 21,16; "I"
280 PRINT AT 21,18; "I"; AT 21,12; "I"
290 PRINT AT 21,14; "I"; AT 8,15; "+"
300 PRINT AT 9,15; "+"; AT 10,15; "+"
310 GOTO 310
320 FOR Y = YY-B TO YY+B
330 LET P = (ABS (Y-YY))**2
340 LET M = A*SQR (ABS (1-P/B**2))
350 FOR X = XX-M TO XX+M
360 PRINT AT Y,X; CHR$ I
370 NEXT X
380 NEXT Y
390 RETURN
```

TRS-80 Color Computer/*Turkey*

```
10 CLS(0)
20 READ N,C
30 IF N = 999 THEN 110
40 FOR M = 1 TO N
50 READ Y,B
60 FOR X = 31-B TO 31+B
70 SET (X,Y,C)
80 NEXT X
90 NEXT M
100 GOTO 20
110 READ Y,B,E,C
120 IF Y = 0 THEN 170
130 FOR X = B TO E
140 SET (X,Y,C)
150 NEXT X
160 GOTO 110
170 POKE B,E
180 IF B = 1200 THEN 180
190 READ B,E
200 GOTO 170
1000 DATA 23,7,3,13,4,15,5,17,6,19,7,21,8,23
1010 DATA 9,24,10,25,11,26,12,27,13,28,14,28
1020 DATA 15,29,16,29,17,30,18,30,19,30,20,31
1030 DATA 21,31,22,31,23,30,24,28,25,25,20,4
1040 DATA 4,6,5,7,6,8,7,10,8,11,9,12,10,15,11
1050 DATA 17,12,18,13,19,14,20,15,21,16,22,17
1060 DATA 22,18,23,19,23,20,23,21,22,22,22,23
1070 DATA 21,20,1,6,3,7,3,8,3,9,3,10,3,11,3
1080 DATA 12,7,13,9,14,11,15,13,16,14,17,15
1090 DATA 18,16,19,17,20,17,21,18,22,18,23,19
1100 DATA 24,19,25,19,999,999,1,23,26,7,1,36
1110 DATA 39,7,2,21,28,7,2,34,41,7,26,21,41,1
1120 DATA 26,45,50,1,26,12,17,1,27,22,40,1,27
1130 DATA 47,50,1,27,12,15,1,28,23,39,1,29,26
1140 DATA 27,2,29,36,37,2,30,26,27,2,30,36,37
1150 DATA 2,31,24,25,2,31,34,35,2,31,28,29,2
1160 DATA 31,38,39,2,0,1167,135,0,1168,139
1170 DATA 1199,138,1200,133
```

TRS-80 Models I & III/*Turkey*

```
10 PRINT CHR$(15)
20 CLS
30 READ X,Y,C
40 IF X=9999 THEN 90
50 FOR I=X TO Y
60 PRINT@ I,CHR$(C);
70 NEXT I
80 GOTO 30
90 FOR I = 1 TO 21
100 READ X,C
110 PRINT@ X,CHR$(C);
120 NEXT I
130 GOTO 130
1000 DATA 23,37,40,84,104,40,145,171,40,207
1010 DATA 237,40,269,303,40,331,369,40,394
1020 DATA 434,40,457,499,40,520,564,40,583
1030 DATA 629,40,649,691,40,716,752,40,151
1040 DATA 165,117,213,231,117,276,296,117
1050 DATA 339,361,117,402,426,117,465,491
1060 DATA 117,528,556,117,592,620,117,658
1070 DATA 682,117,220,224,191,283,289,191
1080 DATA 347,353,191,410,418,191,472,484
1090 DATA 191,534,550,191,596,616,191,659
1100 DATA 681,191,721,747,191,785,787,191
1110 DATA 790,806,191,809,811,191,28,32
1120 DATA 32,9999,0,0,158,176,220,190,224
1130 DATA 189,283,186,289,181,346,184
1140 DATA 354,180,409,176,419,176,285
1150 DATA 111,287,111,350,64,414,64,858
1160 DATA 88,866,88,922,88,930,88,985
1170 DATA 88,987,88,993,88,995,88
```

TRS-80 Model 4/*Turkey*

```
10 PRINT CHR$(15)
20 CLS
30 READ X,Y,C
40 IF X = 9999 THEN 90
50 FOR I = X TO Y
60 PRINT@ I, CHR$(C);
70 NEXT I
80 GOTO 30
90 FOR I = 1 TO 27
100 READ X,C
110 PRINT@ X, CHR$(C);
120 NEXT I
130 GOTO 130
1000 DATA 36,44,126,110,130,126,185,215,126
1010 DATA 260,300,126,336,382,126,414,465
1020 DATA 126,492,548,126,570,630,126,650
1030 DATA 710,126,730,790,126,812,868,126
1040 DATA 892,948,126,972,1028,126,1052
1050 DATA 1108,126,1134,1185,126,278,282,191
1060 DATA 356,364,191,436,444,191,516,524,191
1070 DATA 597,603,191,669,691,191,746,774,191
1080 DATA 823,857,191,902,938,191,983,1017
1090 DATA 191,1064,1096,191,1145,1175,191
1100 DATA 1228,1252,191,1309,1331,191,1390
1110 DATA 1410,191,758,762,73,834,846,73,913
1120 DATA 927,73,991,1009,73,1072,1088,73
1130 DATA 1152,1167,73,1234,1246,73,1315,1325
1140 DATA 73,1142,1144,85,1221,1224,85,1256
1150 DATA 1259,85,1301,1304,85,1336,1339,85
1160 DATA 1381,1382,85,1418,1419,85,1176,1178
1170 DATA 85,358,362,32,438,442,32,518,522,32
1180 DATA 598,502,32,9999,0,0
1190 DATA 1476,40,1484,41,1556,40,1564,41
1200 DATA 1477,41,1483,40,1557,41,1563,40
1210 DATA 359,42,360,32,361,42,200,176,440
1220 DATA 111,520,98,600,98,1063,85,1097,85
1230 DATA 277,168,283,148,356,186,364,181
1240 DATA 516,171,524,151,1636,154,1637,144
1250 DATA 1643,160,1644,165
```

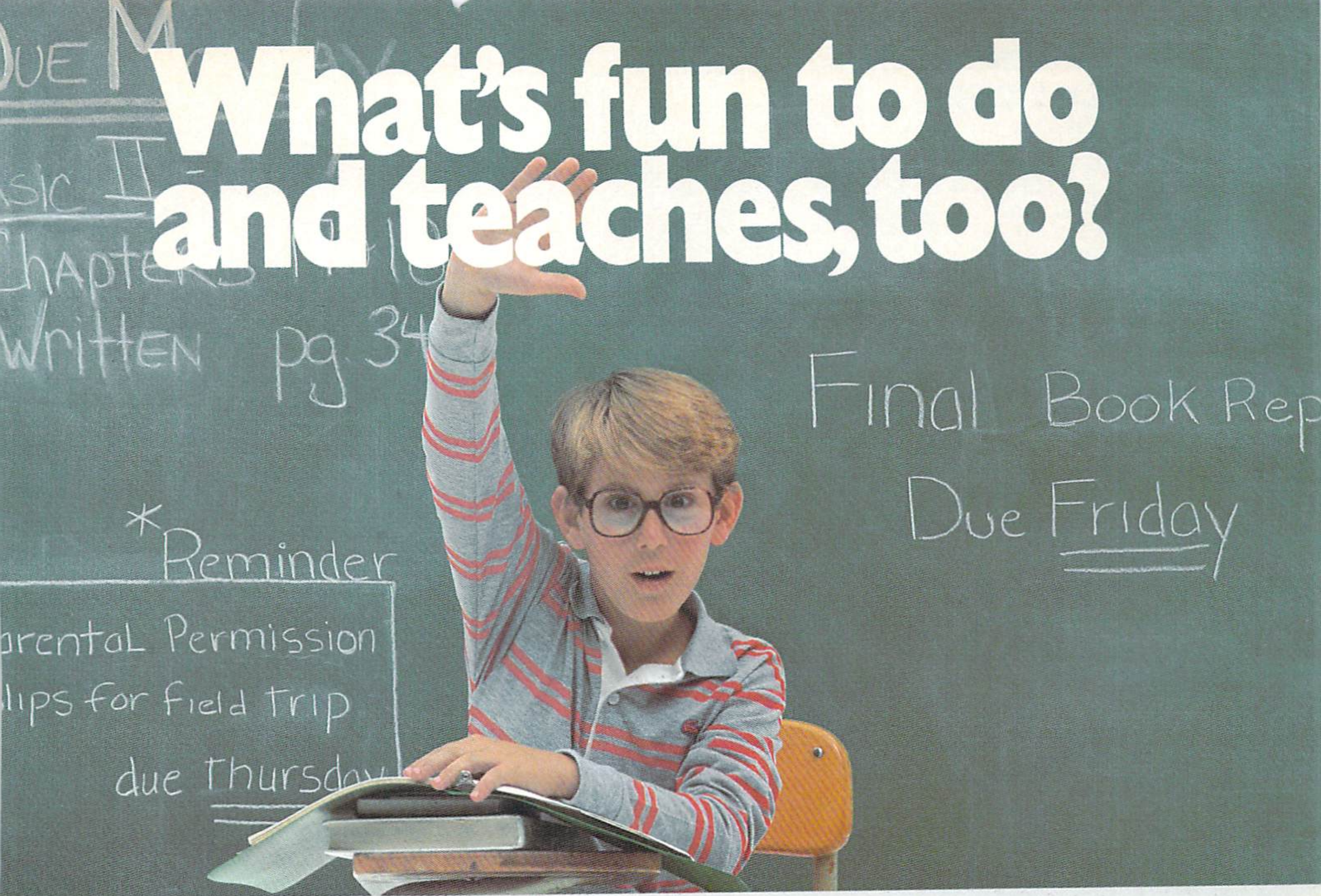

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ILLUSTRATION BY JOSHUA GOSFIELD

Base Version (Commodore 64 & VIC-20)/*Cheerleader*

```
10 PRINT CHR$(147)
20 PRINT "THE CHEERLEADER"
30 FOR T=1 TO 1000
40 NEXT T
50 PRINT CHR$(147)
60 PRINT "       ***"
70 PRINT "      *- -*"
80 PRINT "      * V *"
90 PRINT "      * - *"
100 PRINT "      ***"
110 PRINT "       *"
120 PRINT "      ***"
130 PRINT "       *"
140 PRINT "       *"
150 PRINT "       *"
160 PRINT "      * *"
170 PRINT "     *   *"
180 PRINT "    *     * "
190 PRINT "     *   *"
200 PRINT "      * *"
210 PRINT "      ( )"
220 FOR T = 1 TO 200
230 NEXT T
240 PRINT CHR$(147)
250 PRINT "      ***     RAH"
260 PRINT "     *O O*"
270 PRINT "     * V *"
280 PRINT "  *  * U *  *"
290 PRINT "  *   ***   *"
300 PRINT "   *   *   *"
310 PRINT "    *******"
320 PRINT "       *"
330 PRINT "       *"
340 PRINT "       *"
350 PRINT "      * *"
360 PRINT "     *   *"
370 PRINT "    *     * "
380 PRINT " ( *         * )"
390 PRINT "  *           *"
400 FOR T = 1 TO 200
410 NEXT T
420 GOTO 50
```

TI-99/4A/*Cheerleader*

```
10 CALL CLEAR
20 DISPLAY AT(2,2):"THE CHEERLEADER"
30 FOR T=1 TO 500
40 NEXT T
50 CALL CLEAR
60 DISPLAY AT(2,2):"       ***"
70 DISPLAY AT(3,2):"      *- -*"
80 DISPLAY AT(4,2):"      * V *"
90 DISPLAY AT(5,2):"      * - *"
100 DISPLAY AT(6,2):"      ***"
110 DISPLAY AT(7,2):"       *"
120 DISPLAY AT(8,2):"      ***"
130 DISPLAY AT(9,2):"       *"
140 DISPLAY AT(10,2):"       *"
150 DISPLAY AT(11,2):"       *"
160 DISPLAY AT(12,2):"      * *"
170 DISPLAY AT(13,2):"     *   *"
180 DISPLAY AT(14,2):"    *     *"
190 DISPLAY AT(15,2):"     *   *"
200 DISPLAY AT(16,2):"      * *"
210 DISPLAY AT(17,2):"      ( )"
220 CALL CLEAR
230 FOR T=1 TO 70
240 NEXT T
250 DISPLAY AT(2,2):"      ***     RAH"
260 DISPLAY AT(3,2):"     *O O*"
270 DISPLAY AT(4,2):"     * V *"
280 DISPLAY AT(5,2):"  *  * U *  *"
290 DISPLAY AT(6,2):"  *   ***   *"
300 DISPLAY AT(7,2):"   *   *   *"
310 DISPLAY AT(8,2):"    *******"
320 DISPLAY AT(9,2):"       *"
330 DISPLAY AT(10,2):"       *"
340 DISPLAY AT(11,2):"       *"
350 DISPLAY AT(12,2):"      * *"
360 DISPLAY AT(13,2):"     *   *"
370 DISPLAY AT(14,2):"    *     *"
380 DISPLAY AT(15,2):" ( *         * )"
390 DISPLAY AT(16,2):"  *           *"
400 FOR T=1 TO 70
410 NEXT T
420 GOTO 50
```

MODIFICATIONS FOR OTHER COMPUTERS

Apple/*Cheerleader*

In lines 10, 50, and 240 of the base version replace `PRINT CHR$(147)` with `HOME`
Also, change lines 220 and 400 to read

```
220 FOR T = 1 TO 300
400 FOR T = 1 TO 300
```

Atari/*Cheerleader*

In lines 10, 50, and 240 of the base version replace `PRINT CHR$(147)` with `PRINT CHR$(125)`
Also, change lines 30, 220, and 400 to read

```
30 FOR T = 1 TO 500
220 FOR T = 1 TO 50
400 FOR T = 1 TO 50
```

IBM PC/*Cheerleader*

In lines 10, 50, and 240 of the base version replace `PRINT CHR$(147)` with `CLS`

Timex Sinclair 1000/*Cheerleader*

In lines 10, 50, and 240 of the base version replace `PRINT CHR$(147)` with `CLS`
Also, change lines 30, 220, and 400 to read

```
30 PAUSE 250
220 PAUSE 50
400 PAUSE 50
```

and omit lines 40, 230, and 410.

TRS-80s/*Cheerleader*

In lines 10, 50, and 240 of the base version replace `PRINT CHR$(147)` with `CLS`
Also, change line 30 to read

```
30 FOR T = 1 TO 500
```

and omit lines 140 and 330.

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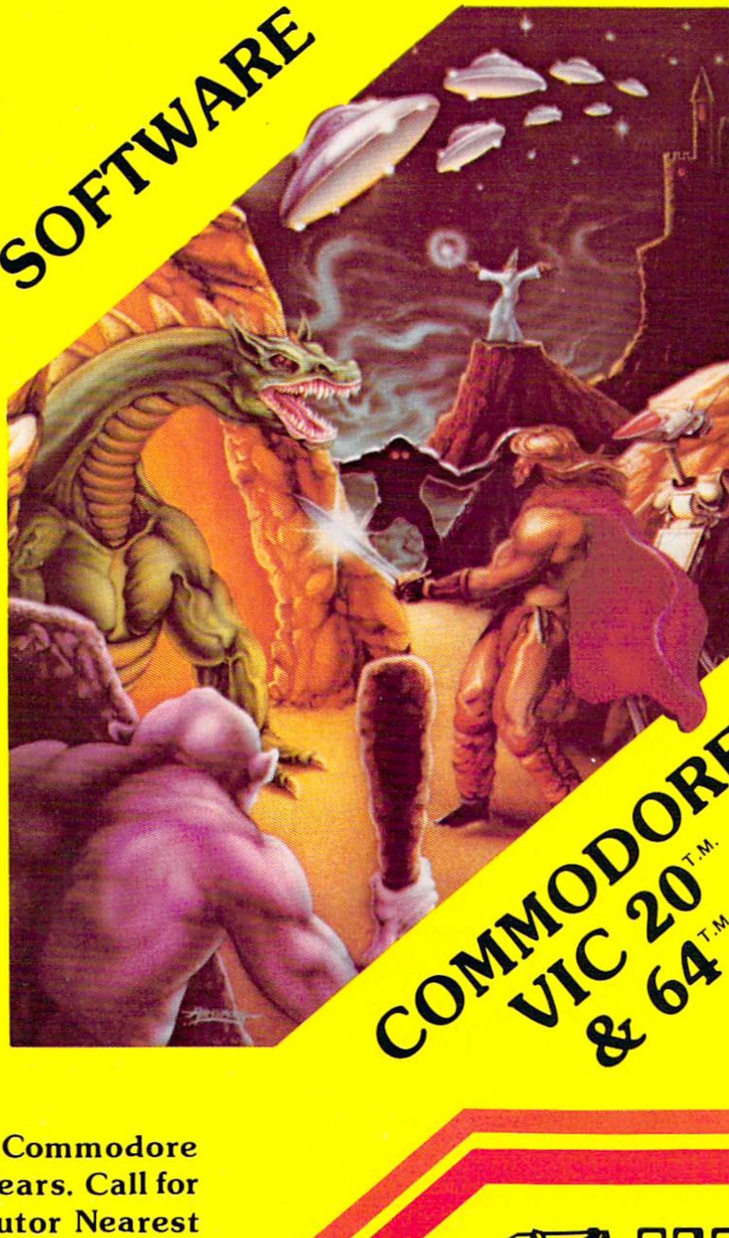

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```
1200 IF V(2) = 0 THEN M = 10: GOSUB 1700: RET
URN
1210 IF V(3) = 0 THEN M = 20: GOSUB 1700: RET
URN
1220 RETURN
1250 IF V(2) = 1 THEN RETURN
1260 M = 7: GOSUB 1700: RETURN
1300 M = 6: GOSUB 1700:V(2) = 1: RETURN
1350 IF V(5) < > 0 THEN RETURN
1360 IF V(2) = 0 THEN M = 10: GOSUB 1700: RET
URN
1370 M = 19: GOSUB 1700: RETURN
1400 IF V(6) = 2 THEN RETURN
1410 IF V(6) < 1 THEN M = 8: GOSUB 1700:V(6)
= 1: RETURN
1420 IF V(7) = 1 THEN M = 18: GOSUB 1700: RET
URN
1430 M = 9: GOSUB 1700:V(6) = 0: RETURN
1450 IF V(6) = 1 THEN RETURN
1460 IF V(6) < 1 THEN M = 8: GOSUB 1700:V(6)
= 2: RETURN
1470 IF V(7) = 1 THEN M = 18: GOSUB 1700: RET
URN
1480 M = 9: GOSUB 1700:V(6) = 0: RETURN
1500 IF V(5) < > 0 THEN RETURN
1510 IF V(2) = 0 THEN M = 10: GOSUB 1700: RET
URN
1520 M = 14: GOSUB 1700:V(5) = - 1: RETURN
1600 HR = 1 + INT (V(4) * (6 / 92))
1610 ME = INT ((V(4) * (6 / 92) - (HR - 1)) *
 59)
1620 PRINT "IT IS ";HR;":";: IF ME < 10 THEN
PRINT "0";
1630 PRINT ME;" PM": PRINT : RETURN
1700 W$ = "":C$ = S$(M + 63): FOR Y = 1 TO LE
N (C$)
1710 W$ = W$ + " " + S$(( ASC ( MID$ (C$,Y,1)
)) - 27)
1720 NEXT Y: PRINT W$: PRINT : RETURN
2000 DATA  HOME,GRAND,MAY,DRIVE,SUPER,FIRST,F
RUGAL,WESTSIDE,UNCLE,AUNT
2010 DATA  FRIENDLY,CHURCH,RIVER,UNISEX,SWEET
,CHEESE,YE,FAMILY,FRUIT
2020 DATA  PUTTING,WAY,BROKE,HAVE,PAST,TURKEY
S,ALL,BOTH,7.00,COMPACT,YOUR
2030 DATA  FAKE,HAS MADE,RIDE,YOU'RE,IT'S,LON
G,CARSICK
2040 DATA  THE,CASH,OVEN DOOR,TURKEY,GRANDMA,
KIDS
2050 DATA  DROPPING OFF,GETTING,OUT OF,TOO,AN
D,IS,WON'T HOLD
2060 DATA  NOT DONE,IT'S CLOSED,TO COOK,CAR,T
IME,BUT,FREEZER
2070 DATA  BURNT,BROKEN,IN,DISPENSER,GAS,SPOI
LED
2080 DATA      >RPAD,SACLV,SADLU,SADLN,HE,HB,A
BXLIB,GAF,HAF,S=IB
2090 DATA  HAC,SO,HY,HAD,AQLIY,A?Q<;AF@,GE,98
QM6EKAF,AT1K5A42Z,S>IY,>037,/DWP
2100 DATA  162,49,203,212,257,189,193,155,267
,106
2110 DATA  80,75,203,279,27,101,54,112,152,12
5
```

Atari/Turkey Panic

```
10 DIM D(20),S$(85),V(7)
20 FOR X = 1 TO 7:V(X) = 0: NEXT X:P = 1
30 FOR X = 1 TO 85: READ S$(X): NEXT X:I$ =
S$(P)
40 FOR X = 1 TO 20: READ D(X): NEXT X
50 HOME : PRINT "YOU ARE AT ";I$: PRINT
60 FOR X = 1 TO 500: NEXT X
70 IF P = 1 AND V(6) < 0 AND V(7) = 2 AND
V(5) > 1 THEN GOSUB 1600: GOTO 290
```

```
80 M = 0: ON P GOSUB 1000,1050,1100,1150,
1200,1250,1300,1350,1400,1450,1500
90 IF M < > 0 OR P < 2 THEN 110
100 PRINT "THANKS FOR THE VISIT," PRINT "BUT
TIME IS RUNNING OUT": PRINT
110 FOR X = 1 TO 500: NEXT X
120 GOSUB 1600
130 FOR X = 1 TO 500: NEXT X
140 PRINT "WHERE TO NOW";: INPUT I$
150 W = 0: FOR X = 1 TO 19: IF LEFT$ (I$,
LEN (S$(X))) = S$(X) THEN W = X
160 NEXT X: IF W > 0 THEN 190
170 PRINT "TYPE THE PLACE NAME EXACTLY"
180 PRINT "AS IT APPEARS ON THE MAP": PRINT
: GOTO 130
190 IF P = W THEN PRINT "WE'RE THERE NOW!":
GOTO 130
200 X = INT (D(P) / 17):Y = INT (D(W) /
17):C = ABS (X - Y)
210 X = D(P) - 17 * X:Y = D(W) - 17 * Y:C =
C + ABS (X - Y)
220 FOR X = 1 TO C:V(4) = V(4) + 1: IF V(6)
< 1 THEN V(6) = V(6) - 1
230 PRINT "BRRM.... BRRM.... BRRM.... ";
240 FOR Y = 1 TO 50: NEXT Y
250 IF V(3) = 0 AND V(4) > 18 THEN PRINT :M
= 15: GOSUB 1700: GOTO 360
260 IF V(6) < - 10 THEN PRINT :M = 16: GOSUB
1700: GOTO 360
270 IF V(4) > 108 THEN PRINT :M = 21: GOSUB
1700: GOTO 360
280 NEXT X:P = W: GOTO 50
290 IF V(4) - V(5) < 42 THEN M = 4: GOSUB
1700: GOTO 360
300 IF V(4) - V(5) > 42 THEN M = 3: GOSUB
1700: GOTO 360
310 PRINT "THE TURKEY IS JUST COOKED"
320 IF V(4) > 92 THEN PRINT "BUT IT'S AFTER
7:00": GOTO 360
330 PRINT "HAVE A GOOD DINNER."
340 PRINT "HAPPY THANKSGIVING!"
350 END
360 PRINT : PRINT "YOU FAILED TO ACCOMPLISH
THE TASK"
370 PRINT "TYPE "; CHR$ (34);"RUN"; CHR$
(34);" AND PRESS <RETURN> TO"
380 PRINT "TRY AGAIN"
390 END
1000 IF V(7) = 1 THEN M = 17: GOSUB
1700:V(7) = 2
1010 IF V(5) > - 1 THEN RETURN
1020 M = 1: GOSUB 1700
1030 IF V(1) = 0 THEN M = 2: GOSUB 1700:
RETURN
1040 V(5) = V(4):M = 22: GOSUB 1700: RETURN
1050 IF V(7) > 0 THEN RETURN
1060 IF V(6) < 1 THEN M = 18: GOSUB 1700:
RETURN
1070 M = 5: GOSUB 1700:V(7) = 1: RETURN
1100 IF V(1) = 1 THEN RETURN
1110 IF V(2) = 0 THEN M = 10: GOSUB 1700:
RETURN
1120 IF V(4) < 38 THEN M = 12: GOSUB 1700:
RETURN
1130 M = 11: GOSUB 1700:V(1) = 1: RETURN
1150 IF V(2) = 0 THEN M = 10: GOSUB 1700:
RETURN
1160 M = 13: GOSUB 1700:V(3) = 80: RETURN
1200 IF V(2) = 0 THEN M = 10: GOSUB 1700:
RETURN
1210 IF V(3) = 0 THEN M = 20: GOSUB 1700:
RETURN
```


6
$\sqrt{892}$
$a^2=b^2+c^2$
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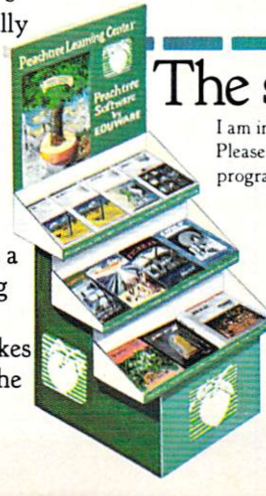

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```
1220 RETURN
1250 IF V(2) = 1 THEN RETURN
1260 M = 7: GOSUB 1700: RETURN
1300 M = 6: GOSUB 1700:V(2) = 1: RETURN
1350 IF V(5) < > 0 THEN RETURN
1360 IF V(2) = 0 THEN M = 10: GOSUB 1700:
RETURN
1370 M = 19: GOSUB 1700: RETURN
1400 IF V(6) = 2 THEN RETURN
1410 IF V(6) < 1 THEN M = 8: GOSUB 1700:V(6)
= 1: RETURN
1420 IF V(7) = 1 THEN M = 18: GOSUB 1700:
RETURN
1430 M = 9: GOSUB 1700:V(6) = 0: RETURN
1450 IF V(6) = 1 THEN RETURN
1460 IF V(6) < 1 THEN M = 8: GOSUB 1700:V(6)
= 2: RETURN
1470 IF V(7) = 1 THEN M = 18: GOSUB 1700:
RETURN
1480 M = 9: GOSUB 1700:V(6) = 0: RETURN
1500 IF V(5) < > 0 THEN RETURN
1510 IF V(2) = 0 THEN M = 10: GOSUB 1700:
RETURN
1520 M = 14: GOSUB 1700:V(5) = - 1: RETURN
1600 HR = 1 + INT (V(4) * (6 / 92))
1610 ME = INT ((V(4) * (6 / 92) - (HR - 1))
* 59)
1620 PRINT "IT IS ";HR;":";: IF ME < 10 THEN
PRINT "0";
1630 PRINT ME;" PM": PRINT : RETURN
1700 W$ = "":C$ = S$(M + 63): FOR Y = 1 TO
LEN (C$)
1710 W$ = W$ + " " + S$(( ASC ( MID$
(C$,Y,1))) - 27)
1720 NEXT Y: PRINT W$: PRINT : RETURN
2000 DATA  HOME,GRAND,MAY,DRIVE,SUPER,FIRST,
FRUGAL,WESTSIDE,UNCLE,AUNT
2010 DATA  FRIENDLY,CHURCH,RIVER,UNISEX,
SWEET,CHEESE,YE,FAMILY,FRUIT
2020 DATA  PUTTING,WAY,BROKE,HAVE,PAST,
TURKEYS,ALL,BOTH,7.00,COMPACT,YOUR
2030 DATA  FAKE,HAS MADE,RIDE,YOU'RE,IT'S,
LONG,CARSICK
2040 DATA  THE,CASH,OVEN
DOOR,TURKEY,GRANDMA, KIDS
2050 DATA  DROPPING OFF,GETTING,OUT OF,TOO,
AND,IS,WON'T HOLD
2060 DATA  NOT DONE,IT'S CLOSED,TO COOK,CAR,
TIME,BUT,FREEZER
2070 DATA  BURNT,BROKEN,IN,DISPENSER,GAS,
SPOILED
2080 DATA  >RPAD,SACLV,SADLU,SADLN,HE,HB,
ABXLIB,GAF,HAF,S=IB
2090 DATA  HAC,SO,HY,HAD,AQLIY,A?Q<;AF@,GE,
98QM6EKAF,AT1K5A42Z,S>IY,>037,/DWP
2100 DATA  162,49,203,212,257,189,193,155,
267,106
2110 DATA  80,75,203,279,27,101,54,112,152,
125
```

MODIFICATIONS FOR OTHER COMPUTERS

Commodore 64 & VIC-20 with Memory Expander/*Turkey Panic*

Use the base version, except change

```
HOME
```

in line 50 to

```
PRINT CHR$(147)
```

TI-99/4A with TI Extended Basic/*Turkey Panic*

Change

```
HOME
```

in line 50 of the base version to

```
CALL CLEAR
```

Also, change lines 150, 370, and 1710 to read

```
150 W = 0: FOR X = 1 TO 19: IF
SEG$(I$,1,LEN(S$(X))) = S$(X) THEN W = X
370 PRINT "TYPE "; CHR$(34); "RUN";
CHR$(34); " AND PRESS <ENTER> TO"
1710 W$ = W$ & " " & S$((ASC(SEG$(C$,Y,1)))
- 27)
```

Finally, you must use a double colon ("::") instead of a single colon to separate multiple statements on a single numbered program line. So, for example, for line 20 instead of

```
20 FOR X = 1 TO 7:V(X) = 0:NEXT X:P = 1
```

you would type

```
20 FOR X = 1 TO 7 :: V(X) = 0 :: NEXT X :: P
= 1
```

TRS-80s & IBM PC/*Turkey Panic*

Change

```
HOME
```

in line 50 of the base version to

```
CLS
```

Also, change lines 10 and 370 to read

```
10 CLEAR 1000:DIM D(20),S$(85),V(7)
370 PRINT "TYPE "; CHR$(34); "RUN";
CHR$(34); " AND PRESS <ENTER> TO"
```

TIPS TO THE TYPIST

1. When you type program lines into your computer, be sure to copy them *exactly* as written. Numbers, punctuation marks, and spaces are very important!

2. Remember to press RETURN or ENTER *after* every completed program line.

3. Run the program when you finish typing it in by typing RUN and pressing the RETURN or ENTER key. If the computer gives you an error message, don't panic. Mistakes can be fixed. List the program by typing the word LIST and pressing the RETURN or ENTER key and double-check each line. A foolproof way to correct a mistake is to type in the entire line again (including its line number). When you list the program again, you should find the new line in place of the old.

4. If you need more help, read the programming guide written for your computer. It will answer questions that can't possibly be covered here.

5. When all else fails . . . turn off the computer and relax.

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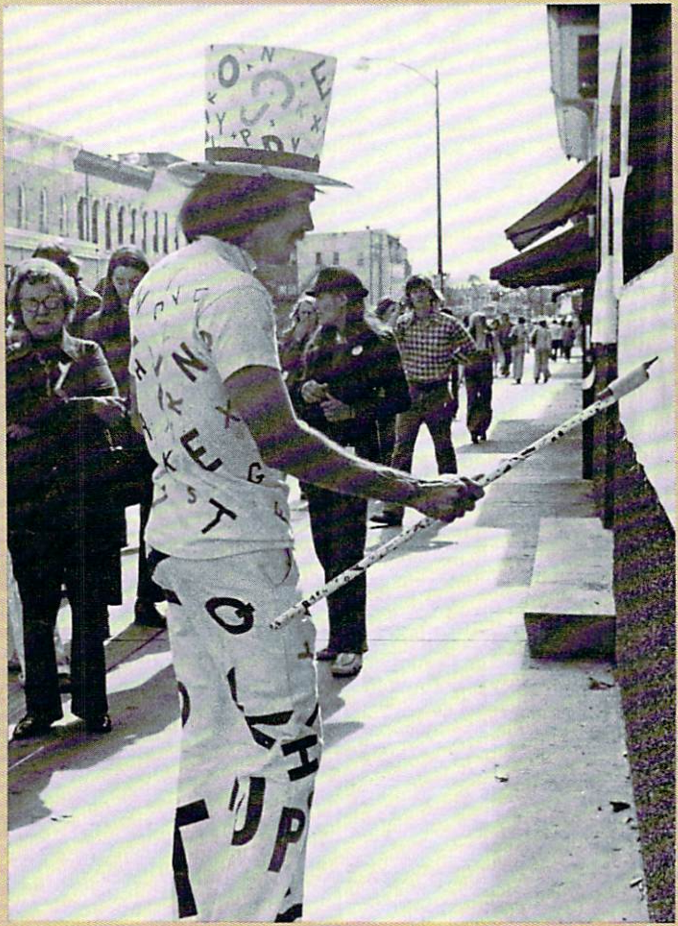
MONEY TALKS—IN RHYME

BY DAVE MORICE



PHOTOGRAPH BY DOM FRANCO

Dave Morice as "Dr. Alphabet" wrapping an Iowa City block with one of his poems.

Last May, I spent eight hours in the window of Books Etc. on Charing Cross Road in London, composing poetry on an Apple IIe computer. Curious onlookers gathered outside the window, drawn by the sign "Computer Poetry Marathon in Progress." Unable to read the writing on the screen, they came into the bookstore. The marathon was staged to launch the British edition of my book *Poetry Comics*. The topics for the poems were as varied as the bystanders suggesting them. The only connection was that all the poems started with first lines from the day's newspaper stories.

On the plane ride back home, I continued thinking about computers and poetry. How could I get a computer to write a poem for *me*? It seemed as if it could easily be done—first by writing separate sets of phrases, carefully chosen to work together, and then by programming the computer to access the lines by some sort of random number system.

As I contemplated the problem, the flight attendant interrupted my train of thought, asking me if I wanted to buy a drink. I ordered wine, and she returned shortly with a small bottle of burgundy and my three dollars in change.

Then I saw it! The solution lay in the serial number on a dollar bill! Surely that number is as good a random number as any.

During the next few weeks I wrote the accompanying *Dollar Bill Serial Number* program. Once you've typed the program into your computer, run it, and answered a few simple questions, all you have to do is pull a dollar bill out of your wallet and enter its serial number, and the computer will write a poem for you.

I've always been interested in new ways to approach the old traditions in literature. It seems that writing, poetry in particular, has a lot of competition from television, movies, and other forms of modern entertainment. My continuing aim is to generate an interest in poetry by presenting poems in dramatic new ways.

Once, as an instructor of a senior citizens' poetry class in Iowa City, I wrote line fragments on different poker cards. After my students were dealt a hand, they wrote poems with the lines. I've presented other projects on a much larger scale. I once appeared on the "Tomorrow" show and wrote a "body poem" on the white dress worn by my female assistant. Tom Snyder approved. Another time I traded in my pen for a cake decorator tube, and composed a poem on a wedding cake during a marriage ceremony. My poems have spanned 1,000-foot-long suspension bridges, wrapped city blocks, and risen skyward attached to helium-filled balloons. These poetry marathons are often part of literary celebrations, grand openings of bookstores, or school festivals. I often dress for the occasion as "Dr. Alphabet," wearing white clothing from top to bottom (including top hat and cane), patterned with hand-painted letters of the alphabet.

Too often people have the wrong idea about poets and poetry. They think that poets are recluses and that poetry is complex. The truth is that anybody can be a poet.

Even your computer!

Base Version (Timex Sinclair 1000 with 16K RAM Pack)/*Dollar Bill Serial Number*

```
10 DIM D(8)
20 PRINT "WHAT IS YOUR NAME?"
30 INPUT N$
40 PRINT N$;" IS A NICE NAME."
50 PRINT "TELL ME, ";N$;", "
60 PRINT "ARE YOU MALE OR FEMALE (M OR F)?"
70 INPUT S$
80 IF S$="F" THEN LET S$="HER"
90 IF S$="M" THEN LET S$="HIS"
100 IF S$(1)<>"H" THEN GOTO 50
110 PRINT "WHAT IS THE NAME OF YOUR FRIEND?"
120 INPUT F$
130 PRINT "WHAT ROOM ARE YOU IN?"
```

DAVE MORICE *is the author of the recently published Simon & Schuster book* Poetry Comics *and is currently working on a new cartoon book about computers. He often dreams about his job as a computer typesetter at the University of Iowa in Iowa City.* [See Computing Confidential, p. 36.]

```
140 PRINT "(BEGIN WITH ""THE"")"
150 INPUT R$
160 PRINT "WHAT IS THE SERIAL NUMBER ON"
170 PRINT "YOUR DOLLAR BILL? (DIGITS ONLY)"
180 INPUT D$
190 FOR X=1 TO 8
200 LET D(X)=VAL (D$(X))
210 IF D(X)>4 THEN LET D(X)=D(X)-5
220 LET D(X)=5*(X-1)+D(X)+1
230 NEXT X
240 DIM A$(40,20)
250 LET A$(1)="BROKE"
260 LET A$(2)="CRACKED"
270 LET A$(3)="KICKED"
280 LET A$(4)="ATE"
290 LET A$(5)="DROPPED"
300 LET A$(6)="TERMINAL"
310 LET A$(7)="MONITOR"
320 LET A$(8)="PRINTER SWITCH"
330 LET A$(9)="VIDEO SCREEN"
340 LET A$(10)="MICROCHIPS"
350 LET A$(11)="SAID"
360 LET A$(12)="WINKED"
370 LET A$(13)="SIGHED"
380 LET A$(14)="MOANED"
390 LET A$(15)="CRIED"
400 LET A$(16)="THAT IS NOT BRIGHT"
410 LET A$(17)="THIS IS NOT RIGHT"
420 LET A$(18)="OH, WHAT A FRIGHT"
430 LET A$(19)="TURN ON THE LIGHT"
440 LET A$(20)="I AM CONTRITE"
450 LET A$(21)="OLD"
460 LET A$(22)="FINE"
470 LET A$(23)="NEW"
480 LET A$(24)="GOOD"
490 LET A$(25)="BEST"
500 LET A$(26)="STOOD IN"
510 LET A$(27)="RAN FROM"
520 LET A$(28)="SAT IN"
530 LET A$(29)="WALKED TO"
540 LET A$(30)="LOOKED IN"
550 LET A$(31)="LAUGHED"
560 LET A$(32)="CHUCKLED"
570 LET A$(33)="SMILED"
580 LET A$(34)="GIGGLED"
590 LET A$(35)="SNICKERED"
600 LET A$(36)="WITH GREAT DELIGHT"
610 LET A$(37)="THROUGHOUT THE NIGHT"
620 LET A$(38)="TO BE POLITE"
630 LET A$(39)="AT SUCH A SIGHT"
640 LET A$(40)="ABOUT THE PLIGHT"
650 CLS
660 PRINT "OKAY, HERE IS YOUR POEM."
670 PRINT
680 LET M=0
690 GOSUB 1000
700 PRINT N$;" JUST ";A$(D(1), TO T)
710 GOSUB 1000
720 PRINT "   THE ";A$(D(2), TO T)
730 GOSUB 1000
740 PRINT "AND ";A$(D(3), TO T);","
750 GOSUB 1000
760 PRINT "   """;A$(D(4), TO T);"."""
770 GOSUB 1000
780 PRINT S$;" ";A$(D(5), TO T);" FRIEND, ";
F$;", "
790 GOSUB 1000
800 PRINT "   ";A$(D(6), TO T);" ";R$
810 GOSUB 1000
820 PRINT "AND ";A$(D(7), TO T)
830 GOSUB 1000
840 PRINT "   ";A$(D(8), TO T);"."
850 STOP
1000 LET M=M+1
1010 LET T=0
1020 FOR I=1 TO 20
1030 IF A$(D(M),I)<>" " THEN LET T=I
1040 NEXT I
1050 RETURN
```

MODIFICATIONS FOR OTHER COMPUTERS

It's possible to write this program more efficiently for the computers listed below. However, they will also run the above Timex version with the few changes shown for each computer. (Because Atari computers do not accept arrays of strings as such, the Atari version of *Dollar Bill Serial Number* is quite different, so it is not given here. For ideas about how to simulate a string array on the Atari, see the Atari version of *Family Voting Booth* on p. 104 of this issue.)

Also, some of the phrases this program prints had to be chosen carefully to compensate for the Timex's lack of an apostrophe. Thus, in addition to the modifications given below for each computer, we recommend that you also change the wording in the following lines:

line 110: for `WHAT IS THE NAME OF YOUR FRIEND`
use `WHAT IS YOUR FRIEND'S NAME`

line 400: for `THAT IS NOT BRIGHT`
use `THAT'S NOT TOO BRIGHT`

line 410: for `THIS IS NOT RIGHT`
use `THIS ISN'T RIGHT`

line 440: for `I AM CONTRITE`
use `I'M NOT CONTRITE`

Apple/*Dollar Bill Serial Number*

Use the base version, except change lines 100, 140, 200, 240, 650, 700, 720, 740, 760, 780, 800, 820, 840, and 850 to read

```
100 IF LEFT$(S$,1) <> "H" THEN GOTO 50
140 PRINT "(BEGIN WITH "; CHR$(34); "THE"; CH
R$(34); ")"
200 D(X) = VAL(MID$(D$,X,1))
240 DIM A$(40)
650 HOME
700 PRINT N$; " JUST "; A$(D(1))
720 PRINT "  THE "; A$(D(2))
740 PRINT "AND "; A$(D(3)); ","
760 PRINT "  "; CHR$(34); (A$(D(4)); "!"; CHR
$(34)
780 PRINT S$; " "; A$(D(5)); " FRIEND, "; F$;
","
800 PRINT "  "; A$(D(6)); " "; R$
820 PRINT "AND "; A$(D(7))
840 PRINT "  "; A$(D(8)); "."
850 END
```

and omit lines 680, 690, 710, 730, 750, 770, 790, 810, 830, and 1000 through 1050.

Commodore 64 & VIC-20/*Dollar Bill Serial Number*

Use the *Apple* version, just changing line 650 to read

```
650 PRINT CHR$(147)
```

TI-99/4A with TI Extended BASIC/*Dollar Bill Serial Number*

Use the *Apple* version, except change lines 100, 200, and 650 to read as follows:

```
100 IF SEG$(S$,1,1) <> "H" THEN 50
200 D(X) = VAL(SEG$(D$,X,1))
650 CALL CLEAR
```

TRS-80s & IBM PC/*Dollar Bill Serial Number*

Use the *Apple* version, except change line 10 to read

```
10 DIM D(8) : CLEAR 1000
```

and leave line 650 as it is in the base version:

```
650 CLS
```

HOW TO TURN YOUR COMPUTER INTO A NAG

Getting a Head Start on the Holidays

BY JONATHAN SINGER

PHOTOGRAPH BY ALEX H. KAPLAN

A photograph of the author in the room that inspired *Auto-Nag*.

Every morning I conduct a "safari" hunt through my room. The goal is always the same: to find my sneakers, which I kicked off in an exhausted state the night before. The only semblance of order is that all my dirty clothes are in one pile on the floor, and all my clean clothes are in another pile.

This lack of organization extends to other areas of my life as well. Studying for my finals at MIT is always delayed while I search through hundreds of pages of notes looking for that one page with all the important information.

But holidays are the worst. Packing for Christmas break is accomplished in a last-minute frenzy during which I throw all my possessions into large garbage bags. Inevitably, on the train ride home I realize that I've forgotten to buy all the presents that I'm supposed to be giving the next day.

In the past, I've managed to accomplish most of my tasks on time, thanks to the incessant nagging of my mother: "Jon! Clean your room! Write your thank-you notes!" But now the responsibility is all mine, since my parents' home in Tarrytown, New York, is about 200 miles away from my dormitory room.

I recently decided that this chronic lack of organization must be changed. But what could I do? I've never found lists to be very helpful. In general, I always try to misplace them. And even when I do find them, I refuse to grant them any authority.

But computers have great control over me. They constantly give directions: PRESS ANY KEY TO CONTINUE, and even I respond immediately! I figured if I could enter all my tasks into a computer and program it to nag me, I'd be much more likely to meet my deadlines.

With Christmas season right around the corner, I set to work writing the accompanying *Auto-Nag* program on my family's IBM PC. While the program was designed with the winter holidays in mind, it can be used year-round for any special occasion that needs extra preparation.

Now, if only I can get a computer to clean my room!

JONATHAN SINGER is a 19-year-old sophomore at MIT and was a summer technical assistant at FAMILY COMPUTING. It took him nearly as long to find the final version of this program as it did to write it.

RUNNING THE PROGRAM

When you begin running *Auto-Nag*, it asks you for the name of the "nagging file" you wish to create (or use, if you've run the program before and have already set up a file). If several members of the family will be using the program, you could use each person's name as the name of his or her file. Or you could set up different files for different purposes and give them appropriate names, such as BIRTHDAY to remind you to buy gifts and make party preparations, or WORK to help you meet deadlines for various school or job assignments.

Your disk directory will list the file names you choose with the extension NAG added onto each one. And if the name you give to a file, event, or activity is too long, the computer will "truncate" it (trim characters off the end).

It's easy to learn how to use the program just by running it. For example, you'll quickly discover that when you're asked to type in a date, you must type it as three two-digit numbers separated by slashes; thus, to enter the date May 1, 1984, you would type 05/01/84. And the program will eventually delete any events that have no activities associated with them.

A final note: When you're done, make sure you choose option 9 (QUIT THE PROGRAM AND SAVE ANY CHANGES) on the "menu" of options; otherwise, any changes you've made will not be saved to your disk.

HOW THE VARIABLES ARE USED

If you want to figure out how the program works, you may find it handy to know what I've used each variable for. Here's a list of the "global" variables (variables used in more than one area of the program) and what their values represent:

A$(X)	Name of activity.
S(X)	Start date of activity.
F(X)	Finish date of activity.
P(X)	Pointer to event; or −1 if activity is to be deleted.
L$(X)	Name of event.
T(X)	Date of event.
N	Total number of activities (including those for which P(X) = −1).
NT	Number of activities for which space is allocated.
E	Total number of events, entered.
ET	Number of events for which space is allocated.
WR	Stands for Writing Required. It's set to 1 if data is to be written to disk at the end of the program.
CH	Number of last option chosen.

TRS-80 Color Computer and Models III & IV/*Auto-Nag*

```
10 DIM G$(6),M(13)
20 FOR I = 1 TO 6:READ G$(I):NEXT I
30 FOR I = 1 TO 13:READ M(I):NEXT I
40 CLS
50 INPUT "Are you starting a new nagging file→
```

```
 (Y/N)";I$:IF I$ = "" THEN END
60 IF ASC(I$) > 90 THEN PRINT "Please type in
 upper case only.":GOTO 50
70 IF I$="N" THEN INPUT "What is the name of
the file you want to use";QU$:WR = 0:GOTO 100
80 INPUT "What name do you want to give it";Q
U$:IF QU$ = "" THEN 50
90 OPEN "O",1,"B:"+QU$+".NAG":WRITE #1,0,0:CL
OSE #1:WR = 1
100 IF QU$ = "" THEN 50
110 OPEN "I",1,"B:"+QU$+".NAG":INPUT #1,N,E:N
T = N + 50:ET = E + 10
120 DIM A$(NT),S(NT),F(NT),P(NT),L$(ET),T(ET)
130 FOR I = 1 TO N:INPUT #1,A$(I),S(I),F(I),P
(I):NEXT I
140 FOR I = 1 TO E:INPUT #1,L$(I),T(I)
150 NEXT I:CLOSE #1
160 CLS:PRINT "Would you like to":PRINT
170 PRINT "  1. LIST ACTIVITIES FOR A PARTICU
LAR DAY"
180 PRINT "  2. List all events"
190 PRINT "  3. List activities relating to a
n event"
200 PRINT "  4. List all activities"
210 PRINT:PRINT "  5. Add a new event and act
ivities relating to it"
220 PRINT "  6. Add activities relating to an
 event"
230 PRINT "  7. Delete an event and all activ
ities relating to it"
240 PRINT "  8. Delete or change an activity"
:PRINT
250 PRINT "  9. Quit the program and save any
 changes"
260 PRINT:INPUT CH:CLS
270 ON CH GOSUB 1000,1100,1200,1300,1400,1500
,1600,1700
280 IF CH > 4 AND CH < 9 THEN WR = 1
290 IF CH <> 9 AND N < (NT - 20) AND E < (ET
- 5) THEN 160
300 Z = 0:FOR I = 1 TO N
310 IF P(I) = -1 THEN Z = Z + 1
320 A$(I) = A$(I + Z):P(I) = P(I + Z):S(I) =
S(I + Z):F(I) = F(I + Z)
330 NEXT I:N = N - Z:X = 1
340 IF X > E THEN 410
350 Y = 0:FOR Z = 1 TO N:IF P(Z) = X THEN Y =
 1
360 NEXT Z:IF Y = 1 THEN 400
370 FOR Y = X TO E:L$(Y) = L$(Y + 1):T(Y) = T
(Y + 1):NEXT Y:E = E - 1
380 FOR Z = 1 TO N:IF P(Z) > X THEN P(Z) = P(
Z) - 1
390 NEXT Z
400 X = X + 1:GOTO 340
410 IF CH <> 9 THEN 160
420 IF WR = 0 THEN PRINT "(No changes)":END
430 PRINT "Saving new data...":OPEN "O",1,"B:
"+QU$+".NAG"
440 WRITE #1,N,E:FOR I = 1 TO N
450 WRITE #1,A$(I),S(I),F(I),P(I)
460 NEXT I:FOR I = 1 TO E
470 WRITE #1,L$(I),T(I):NEXT I:CLOSE #1:END
1000 PRINT "Enter the date you would like to
look at ";:GOSUB 2700:IF U = 0 THEN RETURN
1010 FD = 0:BL = 0:T = U:FOR X = 0 TO 4:Y = 0
:FOR I = 1 TO N:IF F(I) <> (T + X)
OR S(I) > U OR P(I) = -1 THEN 1040
1020 IF Y = 0 THEN Y = 1:PRINT:PRINT G$(X + 1
)
1030 GOSUB 2400:PRINT A$(I),S$,F$,L$(P(I))
1040 NEXT I:NEXT X:PRINT:BL = 0
1050 FOR I = 1 TO N:IF S(I) > T OR F(I) < (T
+ 5) OR P(I) = -1 THEN 1080
1060 IF FD = 1 AND BL = 0 THEN PRINT G$(6)
1070 GOSUB 2400:PRINT A$(I),S$,F$,L$(P(I))
1080 NEXT I:PRINT:IF FD = 0 THEN PRINT "  (No
 activities found)":GOSUB 2800:RETURN
1090 PRINT "    (That's all)":GOSUB 2800:RETUR
N
1100 PRINT "Event",,"Date":PRINT "-----",,"--
--"
1110 FOR I = 1 TO E:U = T(I):GOSUB 2500
1120 PRINT L$(I),,U$
1130 IF I / 20 = INT(I / 20) THEN GOSUB 2800
1140 NEXT I:PRINT:PRINT "    (That's all)":GOS
UB 2800:RETURN
1200 GOSUB 2100:IF L = 0 THEN RETURN
1210 U = T(L):GOSUB 2500
1220 PRINT "            ---<< ";L$(L);" >--< ";
U$;" >>---"
1230 PRINT:PRINT "Activity","Start date","End
 date"
1240 PRINT "--------","----------","--------"
:FD = 0
1250 FOR I = 1 TO N:IF P(I) <> L THEN 1280
1260 GOSUB 2400:PRINT A$(I)," ";S$,F$
1270 IF I/20 = INT(I/20) THEN GOSUB 2800
1280 NEXT I:IF FD = 0 THEN PRINT "No activiti
es found."
1290 GOSUB 2800:RETURN
1300 FOR I=1 TO N:IF I = 1 THEN 1330
1310 IF I/14 > INT(I/14) THEN 1350
1320 GOSUB 2800
1330 CLS:PRINT "Activity","Start date","End d
ate","Event"
1340 PRINT "--------","----------","--------"
,"-----"
1350 IF P(I) = -1 THEN 1380
1360 GOSUB 2400
1370 PRINT A$(I)," ";S$,F$,L$(P(I))
1380 NEXT I:PRINT:PRINT "  (That's all)":GOSU
B 2800:RETURN
1400 IF E < ET - 2 THEN 1430
1410 PRINT "If you wish to add another event,
 please quit the program and run it again."
1420 GOSUB 2800:RETURN
1430 L$ = "":INPUT "Enter name of event";L$:I
F L$ = "" THEN RETURN
1440 L = 0:FOR I = 1 TO E:IF L$(I) = L$ THEN
L = 1
1450 NEXT I:IF L = 1 THEN PRINT "There is alr
eady an event by that name.":GOTO 1400
1460 PRINT "Enter date of ";L$;" ";:GOSUB 270
0
1470 E = E + 1:L$(E) = L$:T(E) = U:L = E
1480 GOSUB 1900:RETURN
1500 GOSUB 2100:IF L=0 THEN RETURN
1510 GOSUB 1900:RETURN
1600 GOSUB 2100:IF L=0 THEN RETURN
1610 PRINT "Are you sure you want to delete "
;L$;" (N/Y)";:INPUT I$
1620 IF I$ <> "Y" THEN RETURN
1630 FOR I = L  TO E
1640 L$(I) = L$(I+1):T(I) = T(I+1)
1650 NEXT I:E = E-1
1660 FOR I = 1 TO N
1670 IF P(I) = L THEN P(I) = -1
1680 IF P(I) > L THEN P(I) = P(I) - 1
1690 NEXT I:RETURN
1700 INPUT "Name of activity";A$:W = 0:FOR I
= 1 TO N:IF A$(I) <> A$ OR P(I) = -1 THEN 173
0
1710 W = W + 1:J = I:GOSUB 2400
1720 PRINT W;" - ";A$(I),S$,F$,L$(P(I))
1730 NEXT I
1740 IF W = 0 THEN PRINT "No activity ";CHR$(
34);A$;CHR$(34);" is recorded":GOSUB 2800:RET
URN
1750 IF W = 1 THEN I = J:GOTO 1810
1760 INPUT "Which of the above";J:IF J < 1 OR
 J > W THEN 1760
1770 I = 0:FOR K = 1 TO J
1780 I = I + 1:IF A$(I) <> A$ THEN 1780
1790 NEXT K:PRINT:GOSUB 2400
1800 PRINT A$,S$,F$,L$(P(I))
```

```
1810 INPUT "Change or delete this (Y/N)";I$
1820 IF I$ = "N" THEN RETURN
1830 GOSUB 2200
1840 IF LT = -1 THEN P(I) = -1
1850 RETURN
1900 IF N > NT - 5 THEN PRINT "If you wish to
 add any more activities, please quit the pro
gram and run it again.":GOSUB 2800:RETURN
1910 N = N + 1:LT = L
1920 A$ = "":INPUT "Enter activity name";A$:I
F  A$ = "" THEN RETURN
1930 PRINT "Enter start date ";:GOSUB 2700:S
= U:S$ = U$
1940 PRINT "Enter end date   ";:GOSUB 2700:F
= U:F$ = U$
1950 IF S > F THEN PRINT "Ending before start
ed!":GOTO 1930
1960 A$(N) = LEFT$(A$,14):S(N) = S:F(N) = F:P
(N) = LT:I = N
1970 IF P(I) = -1 THEN 2000
1980 PRINT:PRINT A$(N),S$,F$,L$(P(N))
1990 INPUT "Okay (Y/N)";I$:IF I$ = "N" THEN G
OSUB 2200:GOTO 1950
2000 INPUT "Add another activity (Y/N)";I$:IF
 I$ = "N" THEN RETURN
2010 GOTO 1900
2100 INPUT "Name of event";L$:L = 0:FOR I = 1
 TO E
2110 IF L$(I)=L$ THEN L = I
2120 NEXT I:IF L > 0 THEN 2140
2130 PRINT "There is no event ";CHR$(34);L$;C
HR$(34):GOSUB 2800
2140 CLS:RETURN
2200 LT = L:INPUT "Delete it (N/Y)";I$
2210 IF I$ = "Y" THEN LT = -1:RETURN
2220 INPUT "New name (RETURN = old)";I$
2230 IF I$ <> "" THEN A$(I) = I$
2240 PRINT "New start date (RETURN = old) ";:
GOSUB 2700
2250 IF U > 0 THEN S(I) = U:S = U
2260 PRINT "New end date   (RETURN = old) ";:
GOSUB 2700
2270 IF U > 0 THEN F(I) = U:F = U
2280 IF S > F THEN PRINT "Ending before start
ed!":GOTO 2240
2290 IF CH <> 8 THEN RETURN
2300 INPUT "New event (RETURN = old)";I$
2310 L = 0:IF I$ = ""  THEN RETURN
2320 FOR J = 1 TO E:IF L$(J) = I$ THEN L = J
2330 NEXT J:IF L = 0 THEN PRINT "No such even
t":GOTO 2300
2340 P(I) = L:RETURN
2400 U = S(I):GOSUB 2500:S$ = U$:FD = 1:BL =
1
2410 U = F(I):GOSUB 2500:F$ = U$:RETURN
2500 ME = 1:IF U < 366 THEN YR = 0:D = U:DA =
 U:GOTO 2540
2510 Y4 = INT((U-366)/1461) + 1:D4 = U + 1096
 - 1461 * Y4
2520 YE = INT((D4 - 1)/365):IF YE = 4 THEN YE
 = 3
2530 YR = 4 * Y4 + YE - 3:D = D4 - 365 * YE
2540 IF D <= 31 THEN DA = D:ME = 1:GOTO 2590
2550 LP = INT(YR/4)*4 = YR AND YR <> 0
2560 IF D <= 59 - LP THEN DA = D - 31:ME = 2:
GOTO 2590
2570 IF D <= M(ME+1) - LP THEN DA = D - M(ME)
 + LP:GOTO 2590
2580 ME = ME + 1:GOTO 2550
2590 U$ = RIGHT$(STR$(ME),2) + "/" + RIGHT$(S
TR$(DA),2) + "/" + RIGHT$(STR$(YR),2)
2600 FOR C = 1 TO 8:IF MID$(U$,C,1) = " " THE
N MID$(U$,C,1) = "0"
2610 NEXT C:RETURN
2700 U = 0:I$ = "":INPUT "(MM/DD/YY)";I$:IF I
$ = "" THEN RETURN
2710 IF LEN(I$)<>8 OR MID$(I$,3,1)<>"/" OR MI
D$(I$,6,1)<>"/" THEN 2700
2720 ME = VAL(LEFT$(I$,2)):DA = VAL(MID$(I$,4
,2)):YR = VAL(RIGHT$(I$,2))
2730 IF YR < 0 OR Y > 99 OR ME < 1 OR ME > 12
 THEN 2700
2740 IF INT(YR/4) = YR/4 AND YR > 0 AND ME =
2 AND DA < 30 THEN 2760
2750 IF DA > M(ME + 1) - M(ME) THEN 2700 ELSE
 2760
2760 LY = INT((YR-1)/4):IF LY < 0 THEN LY = 0
2770 M = M(ME):IF ME > 2 AND INT(YR/4) * 4 =
YR AND YR <> 0 THEN M = M + 1
2780 U = YR * 365 + LY + M + DA:GOSUB 2500:RE
TURN
2800 PRINT:PRINT "Press any key to continue..
.";
2810 X$ = INKEY$ : IF X$ = "" THEN 2810
2820 PRINT:RETURN
2900 DATA Urgent! Today is the last day for..
.,Warning! Only one day left for...,Better hu
rry! Only two days left for...
2910 DATA Don't forget! Only three days left
for...,Pay attention! Only four days left for
...,Also remember...
2920 DATA 0,31,59,90,120,151,181,212,243,273,
304,334,365
```

Modifications for Other Computers/*Auto-Nag*

The IBM. PC version of this program will run on the TRS-80 Models III and 4 as well if you simply change the format of the file names in the three lines that contain OPEN commands. Specifically, change

```
"B:"+QU$+".NAG"
```

in lines 90, 110, and 430 to

```
QU$+"/NAG:1"
```

Of course, you can alter the file name specification in these lines if you want to store your nagging files on a different drive.

ILLUSTRATION BY JOSHUA GOSFIELD

WHAT'S IN STORE

NEW HARDWARE ANNOUNCEMENTS*

COMPUTERS

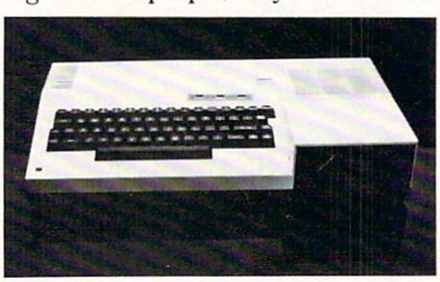
MTX-512
MANUFACTURER: Memotech, 7550 W. Yale Ave., Suite 200, Denver, CO 80227; (303) 986-1516
PRICE: $595

Memotech, the company known for selling peripherals for Timex Sinclair computers, has announced a computer of its own. The MTX-512 is a relatively high-powered computer, aimed at the second-time buyer. It comes with 80K RAM, 16K of which are used to display graphics characters, and it can be expanded to 512K RAM. The 79-key keyboard includes a numeric keypad and eight function keys, which can be programmed by the user to carry out often-used commands or programs.

The MTX-512 can display 16 colors in high resolution, either 40 columns or 80 columns of text, and can mix text with graphics. The built-in Oxford BASIC (it's an English company) includes LOGO-like commands, for programming graphics displays. The computer can be used with a color TV or monitor, and with regular floppy disks or a hard disk for increased storage capacity.

Pied Piper
MANUFACTURER: STM Electronics, 525 Middlefield Rd., Suite 130, Menlo Park, CA 94025; (415) 326-6226
PRICE: $1,299

The Pied Piper, designed for traveling businesspeople, may be the least



expensive "transportable" computer on the market. It doesn't have a built-in monitor (a TV or monitor can be used), but the Pied Piper comes with free software. The company includes four software packages, worth about $1,500, with the $1,299 computer. These are: *PerfectWriter*, a word processor; *PerfectSpeller*, a 50,000-word spelling checker; *PerfectFiler*, a data-base program that may be used with the word processor; and *PerfectCalc*, an electronic spreadsheet.

Pied Piper has a CP/M operating system, which should mean that a wealth of business applications software is available for use. Since the computer employs a nonstandard "minifloppy" disk drive, however, only software in that format will work.

The 64K RAM computer, which weighs only 11½ pounds, has a built-in disk drive capable of storing up to 784K RAM. (Some users say that the disk drive falls out if the computer is dropped on the ground.) A second disk drive, or a hard disk drive system, may be added. Other expansion options include a telephone modem, a color graphics generator, a speech synthesizer, and joysticks.

TRS-80 Micro Color Computer
MANUFACTURER: Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3300
PRICE: $119.

The TRS-80 Micro Color Computer is a small-scale version of Radio Shack's popular Color Computer. The Micro (Model MC-10) has calculator-style keys and 4K RAM. Tandy Corp. says this will be expandable to 20K in the future. The MC-10 can display eight colors in low resolution, and 16 lines of text at 32 characters a line. It is in Radio Shack stores now.

The MC-10 is designed to be used with a tape recorder, for loading and/or storing programs, and a TV. It can also be connected to a printer or modem. No software has yet been written for the Micro Color Computer, but most "homemade" programs that work on a 4K TRS-80 Color Computer will run on the Micro with minor modifications, according to Tandy Corp.

MODEMS

Volksmodem
MANUFACTURER: Anchor Automation, 6913 Valijean St., Van Nuys, CA 91406; (213) 997-6493
PRICE: $69

Anchor Automation, former maker of computerized snack food machine controls, has applied its expertise to a new line of products—modems. Its new Volksmodem connects with Radio Shack, Atari, IBM, Texas Instruments, and Osborne computers, using a $12 cable. However, to actually use the modem for telecommunications—either "chatting" with another computer user or calling up an information service—you will need to obtain "communications" software at an additional cost. Prices range from $50 to $300.

True to its name, which translates as "the people's modem," Volksmodem will be available in most department stores and other mass-merchandising outlets. The Volksmodem is a direct-connect modem, meaning it plugs directly into the modular phone jack.

**These products have been announced by manufacturers, but are not necessarily in the stores yet. Some products may still be under development. Call or write the manufacturer for expected date of delivery.*

WHAT'S IN STORE
NEW HARDWARE

PRINTERS

TP-10 Thermal Printer
MANUFACTURER: Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102; (817) 390-3300
PRICE: $99

The low-cost TP-10 thermal printer is designed to be used with Radio Shack's TRS-80 Color Computer and Micro Color Computer. The printer's serial interface is compatible with both these computers.

The TP-10 prints 32 characters a line at a speed of 30 characters per second. It uses 4 1/8"-wide thermal paper, which costs $4 for a pack of two rolls at Radio Shack stores. The thermal can print any of the 16 graphics characters produced by the Micro Color Computer. It also has an "elongation" mode for expanded print.

MISCELLANEOUS

Apple II Speaker
MANUFACTURER: The Alien Group, 27 W. 23rd St., New York, NY 10010; (212) 741-1770
PRICE: $25

Because of its efficiency and its placement outside the computer, this speaker generates a much higher-volume sound and clearer tone than the smaller speaker inside the Apple II plus. The Alien speaker cable comes with the same connector used by the Apple speaker, so the two speakers can be easily interchanged.

IS PipeLine
MANUFACTURER: Interactive Structures Inc., 146 Montgomery Ave., Bala Cynwyd, PA 19004; (215) 667-1713
PRICE: $230–$440 (depending on model)

This printing buffer can store information that's been typed into the computer until the printer is ready to accept it—so that your computer doesn't have to wait for the printer to finish before starting another task. The buffer's RAM ranges from 8K to 128K, depending on the model. It uses the standard Centronics parallel interface, which means it's compatible with a wide range of computers and printers.

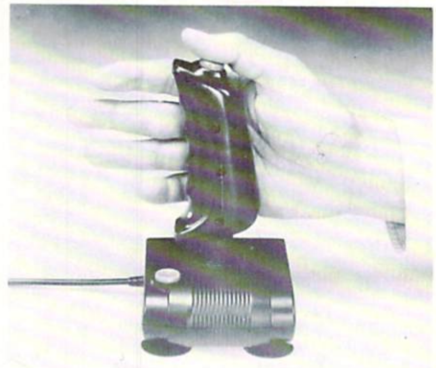
The IS PipeLine also has a feature called Random Access Printing, which allows the user to store paragraphs or addresses, move them around, and print them out in any order.

LP-10
MANUFACTURER: Tech-Sketch, Inc., 26 Just Rd., Fairfield, NJ 07006; (800) 526-2514
PRICE: $39

The Tech-Sketch light pen (model LP-10) allows you to draw by touching a pen to the computer screen. With the same technique, you can also select items from Tech-Sketch program menus. The light pen works with Atari and Commodore computers. A special interface card ($99.95) is required for use with Apple computers.

Tech-Sketch offers 11 software programs—mostly painting, math, or alphabet programs—that youngsters can use with the light pen. The programs, on cassette, cartridge, or disk, range in price from $15 to $50. A demonstration cassette comes with purchase.

Quick-Shot Joystick
MANUFACTURER: SpectraVideo, 39 W. 37th St., New York, NY 10018; (212) 869-7911
PRICE: $13



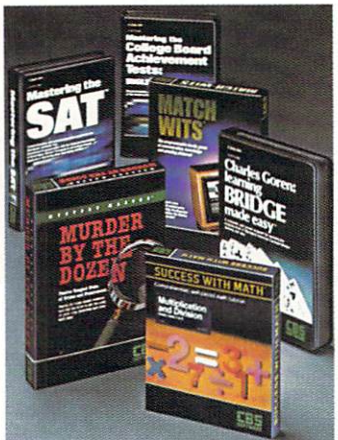
The hand-contoured Quick-Shot joystick features two fire buttons: a thumb-trigger, rapid-fire button on top, and an optional left-hand fire button. Suction cups ensure that the joystick will stay in place while game players fire away. The Quick-Shot works with Atari 400 and 800, and VIC-20 computers.

[Watch for the "Buyer's Guide to Joysticks" in the December issue of FAMILY COMPUTING.*]*

Smart ASCII Plus
MANUFACTURER: Midwest Micro Inc., 311 W. 72nd St., Kansas City, MO 64114; (816) 333-7200
PRICE: $59

Smart ASCII Plus is a hardware/software package designed to connect VIC-20 and Commodore 64 computers to printers. Included is a cable to connect the computer to a printer, and a software package that allows Commodore graphics to be printed on a wide range of dot-matrix printers. With many printer interfaces, it isn't possible to print out these graphics. Smart ASCII Plus is compatible with most application programs written for Commodore computers.

WE TICKLE THE MIND.



Programs for Apple II +/IIe, Commodore 64, Atari 400/800/1200XL, and IBM-PC.

If you're looking for computer programs that can satisfy you in special ways, take a look at CBS Software.

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MASTERING THE SAT™ (Apple, IBM)—It's a private tutor that helps college-bound students score better on the Scholastic Aptitude Test! Developed with the National Association of Secondary School Principals.

MASTERING THE COLLEGE BOARD ACHIEVEMENT TESTS: ENGLISH COMPOSITION™ (Apple, IBM)—This comprehensive, self-paced preparation program covers the four categories of questions found in the ECAT—helps students analyze their need for further study.

CHARLES GOREN: LEARNING BRIDGE MADE EASY™ (Apple, IBM)—You'll play better bridge by actually learning from the world's foremost bridge authority, Charles Goren.

MYSTERY MASTER™: MURDER BY THE DOZEN™ (Apple, Commodore, IBM)—Mystery buffs can sharpen their deductive reasoning skills on this exciting and entertaining concept in crimebreaking: the compudunit! Twelve crimes can be investigated by up to four players in a race to unmask the perpetrator.

MATCH-WITS™ (Apple, IBM)—Here's a challenge to your knowledge and powers of concentration and memory. Play it solo—better yet, in competition—and if that's not enough, program in your own challenges!

We know you're itching for software that can do more for you.

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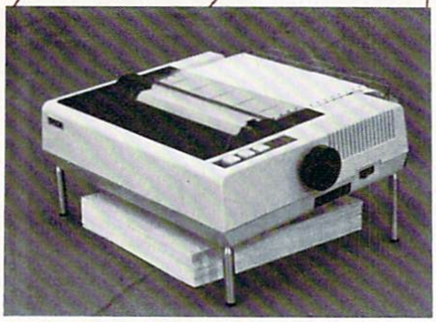
CBS SOFTWARE

WHAT'S IN STORE



ELEVATE YOUR EPSON

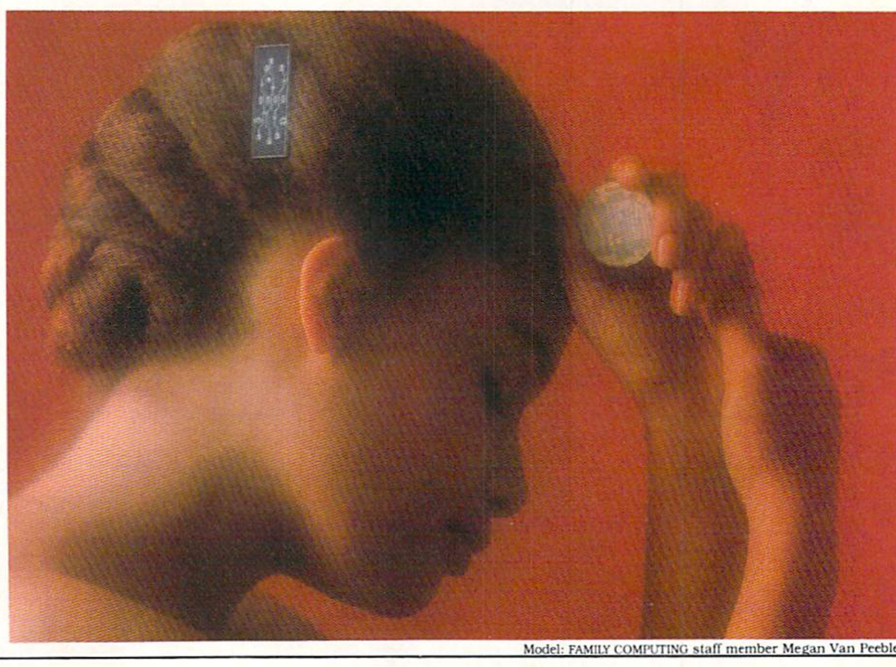
And clean up your computer work area with these printer stilts. Solid aluminum rods with rubber feet minimize vibration and ensure that your printer won't slip away. Manufactured in two sizes to uplift the Epson MX-70/80 or MX-100 dot-matrix printer, the stilts may also be used with printers for Texas Instruments or IBM personal computers. Order Printer Stilts from Datatek, Inc., for $9.95 plus $2 postage and handling, P.O. Box 5956, Shreveport, LA 71135; (318) 868-2241. Specify whether you wish stilts for the MX-70/80 or MX-100.

GRIME PREVENTION

Dirty disk drives and crusty cassette decks can wreak havoc on carefully keyed-in programs or prized fantasy adventure games in progress. Prevent processing errors that spring from dirty drive heads with this Disk Drive Cleaner and Computer Cassette Drive Care Set from Discwasher. Special cleaning disks and cassettes zero in on drive heads most susceptible to these deposits. Available for $14.95 (cassette), $24.95 (5¼-inch disk), and $29.95 (8-inch disk) at many computer stores, or through the manufacturer: Discwasher, 1407 North Providence Rd., P.O. Box 6021, Columbia, MO 65205; (314) 449-0941.

CIRCUIT BOARD BAUBLES

You're sure to be *au courant* with these electronically inspired accessories. Cast in metallic nickel or copper, the motif adorns a variety of items: belt buckles, pill boxes, contact lens cases, pendants, and more. For those of us who remain convinced that all that glitters *is* gold; the line includes bracelets, money clips, pendants, and rings made of gold or sterling silver and studded with precious gems. Most of those computer creations cost from $4 to $15 and up to $250 for luxury trinkets like the gold bracelet. They are available at many retail and computer stores or through the manufacturer: Computer FX, P.O. Box 487, Okemos, MI 48864; (517) 337-0400.



PHOTOGRAPH BY ANTHONY LOEW

Model: FAMILY COMPUTING staff member Megan Van Peebles

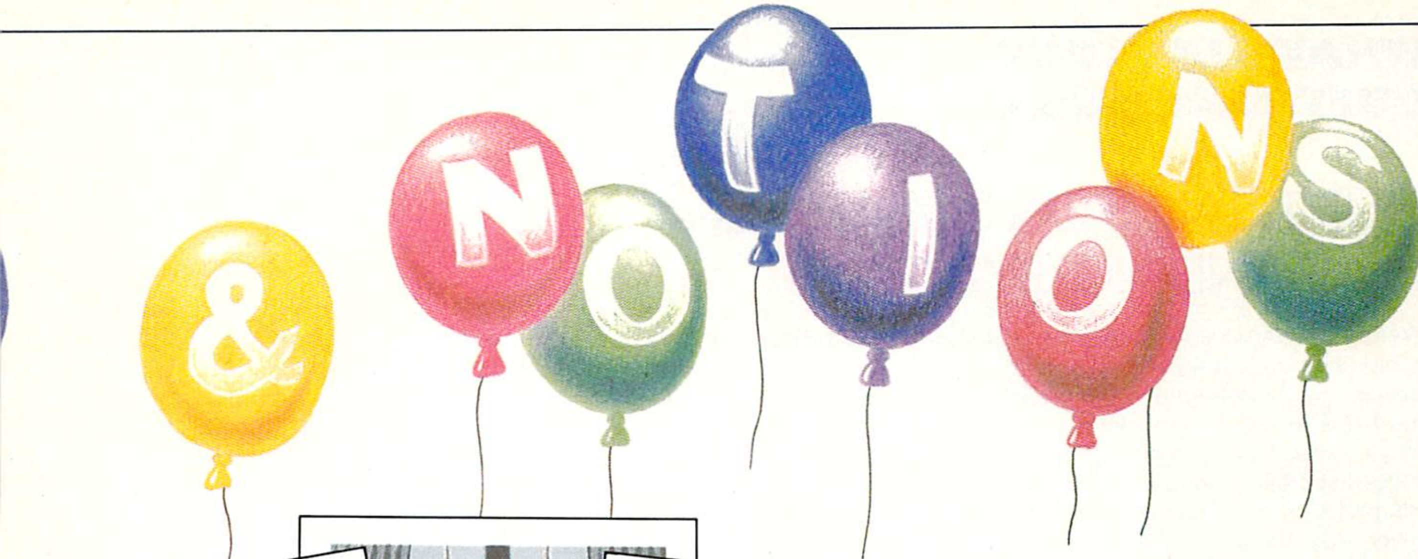
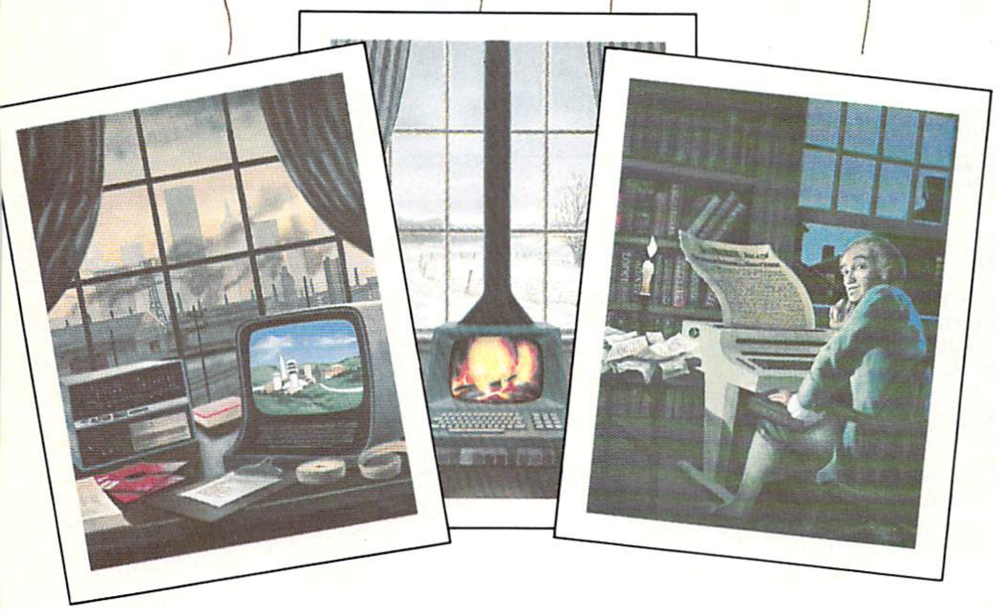


ILLUSTRATION BY KEVIN WALTER

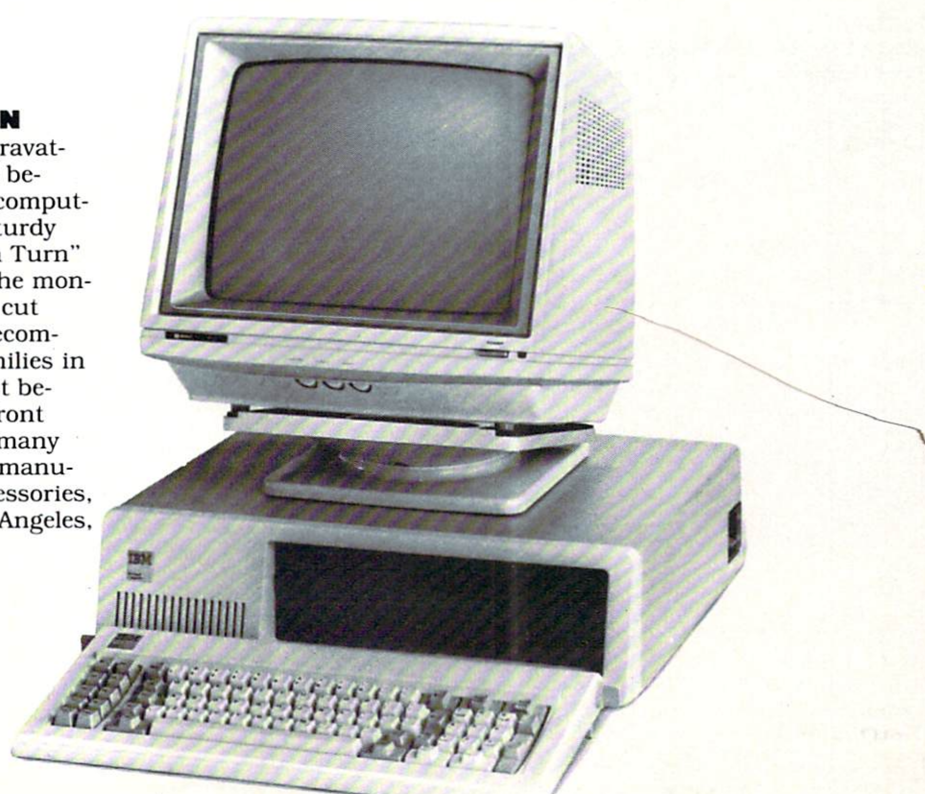


ART TECHO

This winter, warm up the walls of your living room or family room (or wherever your family keeps its personal computer) with a different kind of computer graphic. Artist Robert Tinney's cheerful, witty paintings have adorned the covers of *Byte* magazine and now are available in a limited collector's edition. Each print is personally inspected and signed by the artist, and available for $25 plus $3 postage and handling from Robert Tinney Graphics, 1864 N. Pamela Dr., Baton Rouge, LA 70815; (504) 272-7266.

COMPUTER REVOLUTION

You don't have to endure aggravating neck crane and eyestrain because of a poorly positioned computer monitor. Constructed of sturdy plastic and metal, the "Tilt 'n Turn" platform allows you to turn the monitor and adjust the screen to cut down glare. It's also highly recommended for game-playing families in which every computer contest becomes a struggle for screen-front seating. Available for $40 at many computer stores or from the manufacturer: Microcomputer Accessories, Inc., 1545 Pontius Ave., Los Angeles, CA 90025; (213) 477-4216.



QUICK TAKES ON SOFTWARE—NEW AND NOTEWORTHY

Welcome to FAMILY COMPUTING's Software Guide, the most comprehensive listing available of two dozen of the newest, most noteworthy and/or best programs on the market. Our reviewers include families from all over the country who have judged the software according to the following criteria: long-term benefits and applications, adaptability, and advantages of using a computer for a given task. Following the chart are more detailed reviews of several of the programs.

Here's a rundown of the ratings categories and what they mean: **O** = Overall performance, and refers to the software's performance given the limitations and capacities of the particular computer for which it is intended; **D** = Documentation, or the instructions and literature that accompany a program; **EH** = Error-handling, the software's capacity to accommodate errors made by the user—an especially important consideration with software for younger users; **GQ** = Graphics quality, also evaluated in light of each particular brand's graphics capabilities; **EU** = Ease of use after the initial learning period, which varies from computer to computer; **V** = Value for money, or how the software measures up to its price.

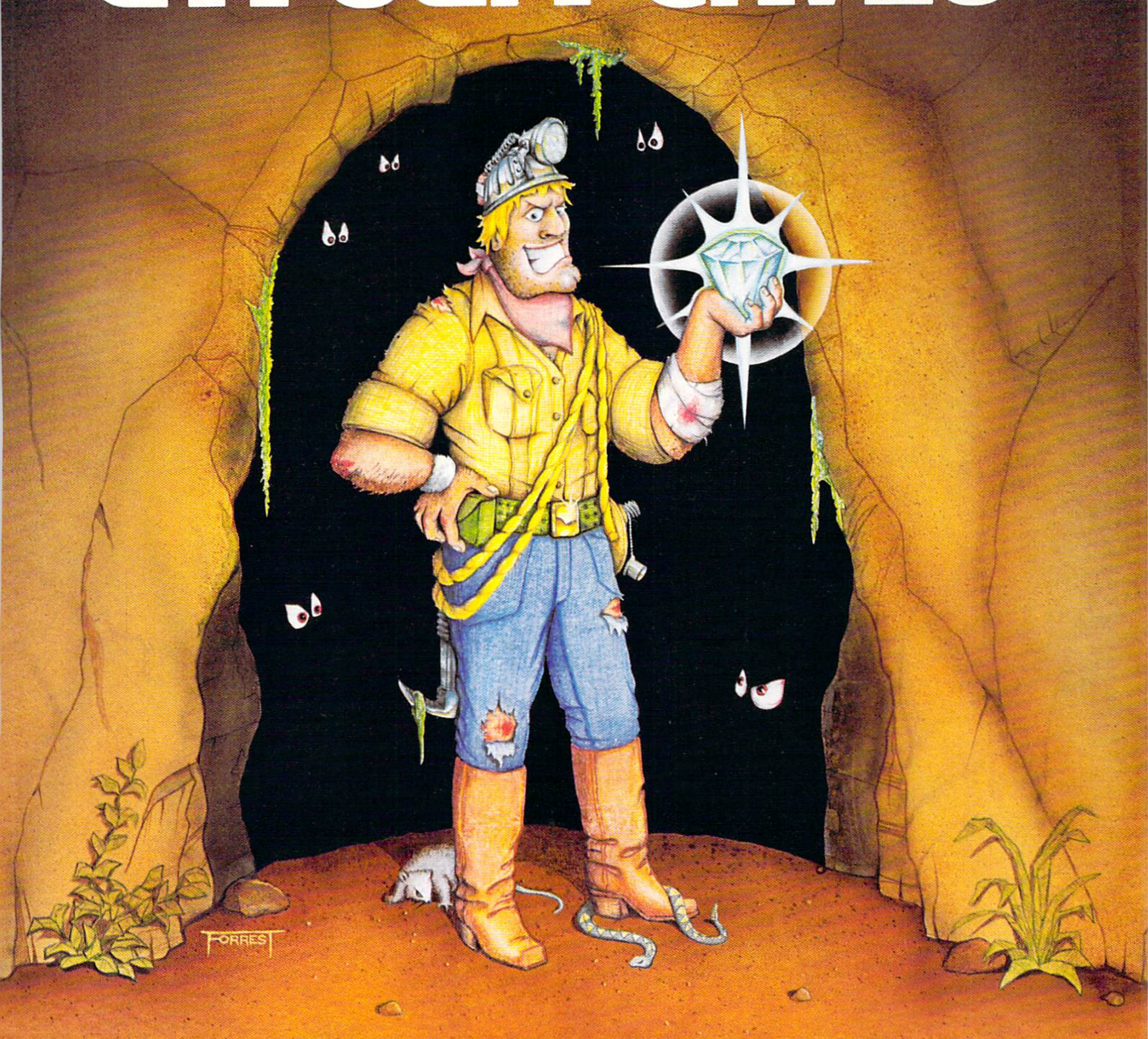
HOME BUSINESS & HOME MANAGEMENT

Title / Manufacturer / Price	Brief Description	Hardware/ Equipment Required	Backup Policy	Ratings O	D	EH	GQ	EU	V
ELECTRIC PENCIL IJG, Inc. 1953 W. 11th St. Upland, CA 91786 (714) 946-5805 cassette $79.95 disk $89.95 © 1980	Write and edit correspondence, term papers, recipes. Organize, keep track of, and print out information with this word processor that features easy delete and insert functions.	TRS-80 I (level 2)/III/IV (in Model III mode), 32K (disk), 16K (cassette)	Defective material replaced free w/in 30 days; $15 fee thereafter; owner makes backup copy	★★★★	★★★	★★★★	n/a	E	★★★★
FAMILY FINANCES Atari, Inc. 1312 Crossman Ave. P.O. Box 61657 Sunnyvale, CA 94086 (800) 538-8543 $49.95 © 1982	Two-program package with easy-to-understand introductory sample entries helps plan and track family budget. Especially recommended for self-employed or multi-income families.	Atari 400/800/1200, 32K (disk)	Defective disks replaced w/in 90 days	★★★★	★★★	★★★★	n/a	E	★★★
THE HOME IMPROVEMENT PLANNER Timex Computer Corp. Waterbury, CT 06725 (800) 248-4639 $14.95 © 1982	For the family with many rooms to redecorate, program helps calculate and price required quantities of wall and floor covering, thereby forecasting cost of home improvement. †	TS 1000, 16K (cassette)	Defective cassettes replaced free w/in 90 days	★★	★★	★★	n/a	E	★★★
THE MONEY MANAGER Timeworks, Inc. P.O. Box 321 Deerfield, IL 60015 (312) 291-9200 Commodore 64 $24.95 TS 1000 $16.95 © 1983	Data-base manager helps keep track of budget. Uses budget vs. actual expenditure chart to monitor finances. Drawbacks include lack of budget sub-categories and entry for only one source of income.	Commodore 64 (disk or cassette); also available for TS 1000, 16K (cassette)	Defective or user-damaged material replaced free	★★★	★★	★★	n/a	A	★★★
THINKTANK Living Videotext 450 San Antonio Rd. Suite 56 Palo Alto, CA 94306 (415) 857-0511 $150 © 1983	Impressive idea organizer, file, and word processor aids in home and business organization. Flexible, powerful program enables user to create loose outline and enter appropriate information. †	Apple II plus/IIe, 64K; II plus requires 80-column card for upper-and lower-case, 80-column display; IIe requires 80-column card; Apple III, 96K; 2 disk drives required	Defective disks replaced free w/in 90 days; owner makes backup copy	★★★★	★★★★	★★★★	n/a	E	★★★★
VISICALC VisiCorp 2895 Zanker Rd. San Jose, CA 95134 (408) 946-9000 Distributed through Atari, Inc. $199.95 © 1980	Electronic spreadsheet program best suited for home-business budget preparations, such as financial reports and cost projections. Powerful program enables user to readjust and recalculate figures and costs easily. †	Atari 400/800/1200, 32K (disk); also available for Apple II/II plus/IIe, 64K (disk); IBM PC, 64K (disk); TRS-80, II, 64K (disk)/III 48K (disk)/IV 64K (disk)	Defective disks replaced free w/in 90 days	★★★★	★★★★	★★★★	n/a	A	★★★

RATINGS KEY O Overall performance; **D** Documentation; **EH** Error handling; **GQ** Graphics quality; **EU** Ease of use; **V** Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

FROM AdVENTURES

GYPSUM CAVES



Daylight Never Felt So Good.

Gypsum Caves is the new computer challenge from AdVENTURES. More than just another 2 minute shoot-'em-up, Gypsum Caves requires timing, common sense, and concentration. One game may last hours or even days.

The player attempts to negotiate the twists and turns of the caves, using objects found along the way to traverse the obstacles and solve the riddles leading to the mysterious final room. Color graphics and sound complete the experience.

Gypsum Caves
by Brian Wagner

C64 or VIC 20

Introductory Price
Cassette................$14.95
Disk........................$16.95

AdVENTURES, Inc.
8718A RICHMOND HIGHWAY
ALEXANDRIA, VIRGINIA 22309

CALL TOLL FREE
1-800-835-2222

In Washington D.C. area call
(703)360-0301

WHAT'S IN STORE SOFTWARE GUIDE

EDUCATION/FUN LEARNING

Title Manufacturer Price	Brief Description	Hardware/ Equipment Required	Backup Policy	Ratings O	D	EH	GQ	EU	V
DUNGEON OF THE ALGEBRA DRAGONS Timeworks, Inc. P.O. Box 321 Deerfield, IL 60015 (312) 291-9200 $24.95 © 1983	Students ages 10 and up try to escape from the dungeon and solve equations breathed by the algebra dragon, while avoiding perilous surprises and accumulating gold by answering problems correctly. †	Commodore 64 (disk or cassette); joystick optional	Defective or damaged material replaced free	★★★	★★	★★★	★★	A	★★★
EARLY GAMES FOR YOUNG CHILDREN Counterpoint Software Suite 140 Shelard Plaza North Minneapolis, MN 55426 (800) 328-1223 $29.95 © 1983	Preschoolers learn fundamental prereading and math skills and draw pictures with a series of simple lo-res games. Activities also familiarize children with computer keyboard. [*See Software for Preschoolers, p. 66.*]	Apple II/II plus/IIe, 48K (disk); Atari 400/800, 16K (cassette), 24K (disk); Commodore 64 (disk or cassette)/VIC-20 (cassette); IBM PC, 64K (disk); TRS-80 I/III, 32K (disk), 16K (cassette); TRS-80 Color Computer, 16K (disk or cassette)	Defective material replaced free; backup copies available for $5	★★★★	★★★	★★★	★★★★	E	★★★★
FACEMAKER Spinnaker Software 215 First St. Cambridge, MA 02142 (617) 868-4700 $34.95 © 1982	Preprogramming skills may rub off on kids four–12 (and over) as they create and animate faces with this primitive graphics-type package. †	Apple II plus/IIe, 48K (disk); Atari 400/800, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk)	Defective disks replaced free w/ in 30 days; $5 fee thereafter	★★	★★★	★★★★	★★★	E	★★
MATH RAIDERS Softsync 14 E. 34th St. New York, NY 10016 (212) 685-2080 $14.95 © 1982	As captain of a spaceship, your five-to-eight-year-old must add, subtract, multiply, and divide to fend off alien invaders in this basic drill-and-practice program.†	TS 1000, 16K (cassette)	Defective cassettes replaced free	★★★	★★	★★	★★★	E	★★★
MICRO MOTHER GOOSE Software Productions 2357 Southway Dr. Columbus, OH 43221 (614) 486-3563 $39.95 © 1983	Nine standard nursery rhymes with music, and three nursery rhyme-related games provide a breezy introduction to the computer, as well as stimulating family fun.†	Apple II/II plus/IIe, 48K (disk); paddles or joystick required	Defective disks replaced free; owner makes backup copies	★★★	★★★★	★★★★	★★★	E	★★
PIPES Creative Software 230 E. Caribbean Dr. Sunnyvale, CA 94089 (408) 745-1655 Commodore 64: $34.95 VIC-20: $29.95 © 1983	Kids control plumber with joystick and lay pipes to connect houses with the town's new water supply in clever, problem-solving program best suited for preteens.†	VIC-20 (cartridge)/ Commodore 64 (cartridge); joystick required	Defective cartridges replaced free w/ in 90 days	★★★★	★★★	★★★★	★★★★	E	★★★★
SPOTLIGHT Children's Television Workshop/Apple Computer 20525 Mariani Ave. Cupertino, CA 95014 (408) 996-1010 $50 © 1982	Nine-to-13-year-olds (and up) reflect spotlights off mirrors, hitting targets in games that introduce principles of angles and reflection. Two simple games that may teach problem-solving skills are included.	Apple II, 48K w/Integer Basic Card/II plus/IIe, 64K (disk); paddles required	Package contains backup disk	★★★	★★★	★★★★	★★★★	E	★★
TURTLE TRACKS Wizware/Scholastic 730 Broadway New York, NY 10003 (212) 505-3000 $39.95 © 1983	Simple, four-command (up, down, left, right) graphics package uses friendly turtle, variety of tracks, and rich bouquet of colors to teach essence of programming to ages nine and up. †	Apple II plus/IIe, 48K (disk); Atari 400/800, 24K (cassette), 32K (disk); Commodore 64 (disk)/VIC-20, 13K (cassette); TI-99/4A, 32K (cassette)	Defective material replaced w/in 60 days; $5 fee thereafter	★★★★	★★★★	★★★★	★★★★	E	★★★★

RATINGS KEY O Overall performance; **D** Documentation; **EH** Error handling; **GQ** Graphics quality; **EU** Ease of use; **V** Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

GAMES									
Title Manufacturer Price	**Brief Description**	**Hardware/ Equipment Required**	**Backup Policy**	**Ratings**					
				O	**D**	**EH**	**GQ**	**EU**	**V**
ARCHON Electronic Arts 2755 Campus Dr. San Mateo, CA 94403 (415) 571-7171 $40 © 1983	Struggle against the computer or a mortal opponent in this dynamic, chess-like strategy and skill game requiring arcade skills, as well as tactical prowess.†	Apple II/II plus/IIe, 48K (disk); Atari 400/800/1200, 32K (disk); Commodore 64 (disk); IBM PC, 64K (disk); joystick required	Defective disks replaced free	★★★★	★★★★	★	★★	D	★★★★
THE BLADE OF BLACKPOOLE Sirius Software 10634 Rockingham Dr. Sacramento, CA 95827 (916) 366-1195 $39.95 © 1982	This adventure may be more frustrating than most gamers want or children can handle. Surprises abound in this colorful game. In case of terminal frustration, call Sirius's hotline.	Apple II/II plus/IIe, 48K (disk); Atari 800/1200, 48K (disk); Commodore 64 (disk)	Defective disks replaced free w/ in 30 days; $5 fee for replacement of user-damaged disks	★★★	★	★★	★★★	D	★★★
BLASTO Texas Instruments, Inc. P.O. Box 2500 Lubbock, TX 79408 (800) 858-4075 $24.95 © 1981	Enjoyable, unsophisticated arcade tank game suitable for all ages allows for solo or two-combatant play. Blast opponents, eliminate mines and other obstacles for points.	TI-99/4/99/4A (cartridge); joystick optional	Defective cartridges replaced free w/ in three months; $10.75 fee thereafter	★★	★★	★★★	★★	E	★★
CRUSH, CRUMBLE AND CHOMP! Epyx, Inc. 1043 Kiel Ct. Sunnyvale, CA 94089 (408) 745-0700 $39.95 © 1981	As a marauding monster from the movies, you dine on citizens, topple bridges, monuments, and skyscrapers in your path, always trying to avoid pursuing tanks and helicopters.†	Apple II/II plus/IIe, 48K (disk); Atari 400/800/1200, 16K (cassette), 32K (disk); Commodore 64 (disk or cassette)/VIC-20, 16K (cassette); IBM PC, 64K (disk)	Defective material replaced free w/ in 30 days; $10 fee thereafter	★★★★	★★★★	★★	★★	A	★★★★
KNIGHTS OF THE DESERT Strategic Simulations 883 Stierlin Rd. Building A-200 Mountain View, CA 94043 (415) 964-1200 $39.95 © 1983	As German General Erwin Rommel, you attempt to route the allies from their North African strongholds in this re-creation of a major World War II campaign. †	Apple II/II plus/IIe/III w/ emulator, 48K (disk); Atari 400/800/1200, 40K (cassette), 48K (disk); Commodore 64 (disk); TRS-80 I (level 2)/III (cassette)	Defective or user-damaged material replaced free w/ in 30 days; backup copies available for $10	★★★★	★★★★	★★	★★★	D	★★★★
MOTHERSHIP Softsync, Inc. 14 E. 34th St. New York, NY 10016 (212) 685-2080 Timex $16.95 © 1983	Simplistic space shoot-'em-up in which you blast oncoming enemy ships all but ruined because of Timex's awkward keyboard controls.	TS 1000, 16K (cassette)	Defective cassettes replaced free	★	★★	★★	★	D	★★
OLD IRONSIDES Xerox Education Publications 245 Long Hill Rd. Middletown, CT 06457 (203) 347-7251 $39.95 © 1983	Attempt to sink your opponent in this two-player re-creation of ship-to-ship naval combat in the great age of sail. Play gets better as you do in this colorful diversion suitable for ages eight and up.	Apple II/II plus/IIe/III w/ emulator, 48K (disk); paddles optional	Defective disks replaced free w/ in 90 days; $10 fee thereafter	★★★	★★★	★★★	★★★	A	★★★
PRESIDENT ELECT Strategic Simulations 883 Stierlin Rd. Building A-200 Mountain View, CA 94043 (415) 964-1200 $39.95 © 1983	Create a candidate or pick from preprogrammed lineup and re-create a presidential election, scheduling public appearances, TV ads, managing campaign funds in this great political role-playing game.†	Apple II/II plus/IIe/III w/ emulator, 48K (disk)	Defective disks replaced free w/ in 30 days	★★★★	★★★★	★	★★	E	★★★★
SAMMY LIGHTFOOT Sierra On-Line Sierra On-Line Bldg. Coarsegold, CA 93614 (209) 683-6858 $34.95 © 1983	Challenging skill arcade game requires split-second timing to bounce boy off trampolines to higher levels and swing from platform to platform. Difficulty limits game to ages 10 and up.	Apple II/II plus/IIe, 48K (disk); joystick recommended	Defective disks replaced free w/ in 90 days; $5 fee thereafter.	★★★	★★★	★★★	★★★	D	★★★
SCORPION Tronix Publishing, Inc. 8295 S. La Cienega Blvd. Inglewood, CA 90301 (213) 215-0529 $39.95 © 1983	Guide a desert creature pursued by ravenous predators around and about the screen in search of frog sustenance. Pleasant program features multiscreen play area and varying skill levels.	VIC-20 (cartridge); joystick required	Defective cartridges replaced free w/ in 90 days; $5 fee thereafter	★★★	★★	★★	★★	A	★★★

RATINGS KEY O Overall performance; **D** Documentation; **EH** Error handling; **GQ** Graphics quality; **EU** Ease of use; **V** Value for money; ★ Poor; ★★ Average; ★★★ Good; ★★★★ Excellent; n/a Not applicable; E Easy; A Average; D Difficult; † Longer review follows chart

WHAT'S IN STORE SOFTWARE REVIEWS

BUSINESS AND HOME MANAGEMENT

The Home Improvement Planner

HARDWARE REQUIREMENTS: TS 1000, 16K (cassette)
MANUFACTURER: Timex
PRICE: $14.95

How much material do you need to wallpaper a 10- by 12-foot room with three windows and two doorways? How many gallons of paint would it require? What's the price difference? And, how many square yards of carpeting for those 120 square feet?

That's a lot of questions. *The Home Improvement Planner* has the answers; it could be a decorator's most-used tool. You can enter the dimensions of any or all areas of your home, and the computer will calculate the amount of materials you need; if you input the price per unit (roll or gallon), you can then find out the total cost of the project.

This program is not practical if you're painting only one room—you could do the calculations yourself in less time than it takes to load the program. But, if you're a compulsive redecorator, or most of the house needs overhauling, this one's for you. As an extra convenience, house dimensions need only be entered once. Save them on tape to be used again at another time.

The program is thorough—it asks for "extra areas" (such as bay windows or alcoves) that might need to be included, and it double-checks your entries in case you've made a mistake. There is even an option for finding the amount of paint you need for the outside of your house.

Some of the programming is a little careless. Often new information will be printed on the screen before the last information is erased: when the number 45 is printed over the word YOU, the final result is a confusing 45U.

There is a "draw a floor plan" routine included, but be warned: it is useless without a printer, and not much better with one. The drawing is slow and the graph guides are awkward.

The floor plan option aside, *The Home Improvement Planner* is a decent program that can be of help to the home improver.

—SHARON AKER

ThinkTank

HARDWARE REQUIREMENTS: Apple II plus/IIe, 64K; II plus requires 80-column card for upper- and lower-case, 80-column display; IIe requires 80-column card; Apple III, 96K; two disk drives required
MANUFACTURER: Living Videotext
PRICE: $150

ThinkTank is, I believe, one of those products that come into the software marketplace unannounced, break new ground, establish new expectations for users, and set new standards for all that follow. *ThinkTank* makes no claim to being a word-processing system, but it certainly fulfills more than the minimal requirements for one. Moreover, as far as I know, it provides capabilities beyond any other word-processing program for microcomputers.

The program allows you to make an outline, which is displayed on your screen. You can then store or display information behind each outline entry. You can add to, move, delete, or edit entries as your ideas evolve without having to begin a new outline each time. When your outline gels, or at appropriate stages in its evolution, you can format the text (specify how you would like it to appear on a page) and print it out. It is simple in concept, but infinite in its application.

All of *ThinkTank's* capabilities are not immediately accessible. For simple tasks such as list making or letter writing, it is easy enough to use with just an hour or two of learning time. As with any tool you use, its full potential will be realized only as you become familiar and skillful in using it. Possible home applications include keeping files of family records—health, financial, and otherwise. Use it to organize and catalog everything from hobbies to telephone numbers, correspondence, and travel plans. As a home business tool, *ThinkTank* could easily take care of much of your administrative needs and facilitate business planning with its memo-writing, idea-structuring, and outlining capabilities.

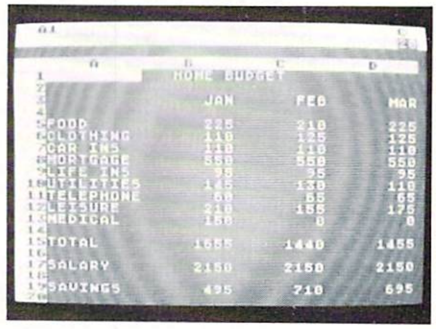
The extensive manual that comes with *ThinkTank* is well organized, written with clarity, and works well as a tutorial and reference manual. An abbreviated reference card listing all operations and commands is included as well.

—DAVID WILSON

VisiCalc

HARDWARE REQUIREMENTS: Atari 400/800/1200, 32K (disk)
MANUFACTURER: VisiCorp/distributed by Atari
PRICE: $199.95

If you haven't witnessed an electronic spreadsheet program like *VisiCalc* in action, you must do so in order to really understand the potential power of your personal computer. Frequently found in many businesses, the program simulates the kind of ledger page used for accounting purposes.



Last year, I was taking a course in manufacturing, the final project of which was to create a company and manufacture a product. We decided to make plastic floppy-disk holders, and my task was to oversee the company's finances. After repeatedly filling my wastepaper basket with discarded notations and calculations, I turned to *VisiCalc*. Also known as a "what if?" program, it enabled me to project what would happen to the production cost of the holders if the waste rate was 15 percent, instead of the predicted five percent, or what would happen if each unit took 10 extra minutes to manufacture. When I changed a value in one category, all corresponding values were readjusted automatically. After we manufactured our line of disk holders, we replaced forecast costs and values with actual ones. This allowed us to compare before and after figures. We could determine the effects on the selling price of our product of differences between projected and actual costs.

A typical *VisiCalc* screen consists of blocks called "cells." In each cell you enter either a label, PRICE/UNIT, for instance, or a value, a dollar figure such as 25.00. Think of the program as an enormous piece of graph paper. There are 63 possible (vertical) columns, and 254 possible (hori-

zontal) rows. Only a small section of the spreadsheet is displayed on the screen at any given moment, but with the arrow keys you can use the cursor to scroll other portions onto the screen. Each cell has a column letter or a row number. The uppermost cell farthest to the left is A1. To enter data, position the cursor over a given cell, simply type the value, and press RETURN. A numeric value can be entered either as a number or as a formula based on values in other cells. This is the most amazing function of electronic spreadsheets. If I have entered the value 10 in cell A1, and the formula A1* 5 (A1 multiplied by 5) in cell B1, then the number 50 will automatically appear in cell B1. Changing the 10 in A1 to 12 will change the corresponding value in B1 to 60.

VisiCalc has a number of features that make the process of setting up your particular model spreadsheet a breeze. A replication function allows you to reproduce a formula over a range of cells so that you won't have to move along a row or down a column and enter a separate function for each particular cell. Having completed your model, you can save it on a disk or print it out.

Exactly who needs a program as powerful and complex as *VisiCalc*? A good question, for it is indeed an expensive program. If you're preparing an extensive budget, keeping complicated financial records, or calculating lengthy cost projections, it will serve as an invaluable tool. A friend of mine bought it to help him prepare his family's tax returns—and felt understandably ripped off with this organizational overkill. It may be only an average value for simple family applications, but it is irreplaceable as a home business tool.

—DEAN VAN DE CARR

EDUCATION/ FUN LEARNING

Dungeon of the Algebra Dragons

HARDWARE REQUIREMENTS: Commodore 64, (disk or cassette)
MANUFACTURER: Timeworks
PRICE: $24.95

There we are, my 14-year-old daughter Beth and I, and our brave computerized alter ego, fearlessly traveling from room to room in the nether

regions of the dungeon of the dreaded Algebra Dragon. Using the joystick, we have already encountered a playful ghost that has swooped upon us and dropped us down a shaft to a lower level. Beth cautiously eases us through the door of room 20, level 3, where we meet the Dragon. At the top of our screen appears the command: HALT! YOU MUST SOLVE THIS EQUATION:

X = 14*Y + 36
Y = 34 SOLVE FOR X

We whip out our trusty pencil and paper, multiply 14 by 34, add 36 to the product 476, and type the answer (512) into the computer. A correct answer! The Algebra Dragon disappears with a whiz-bang whistle and a puff of smoke, and our brave little algebra adventurer is saved again. A message appears on the ceiling—we are richer by 208 gold pieces. We carefully squeeze through another doorway, continuing our search for treasure, adventure, and the two golden keys that will free us from the dungeon and the irascible Algebra Dragon.

At first glance, *Dungeon* looks and plays very much like Timework's popular game, *Robbers of the Lost Tomb. Robbers* has long been a favorite with the younger members of our family. But a closer examination of *Dungeon* reveals differences that, in my opinion, make it a stronger, more interesting game. The Dragon and the algebra problems give the program an educational twist that also serves to hold the interest of both older kids and adults. Good graphics and lively music add to its appeal.

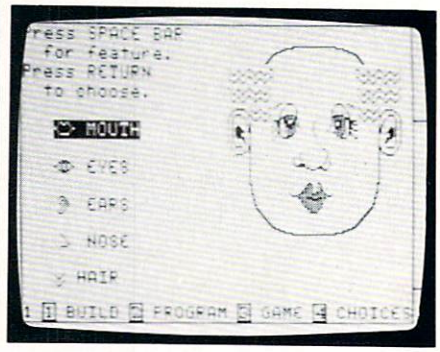
A math teacher friend of mine felt that although *Dungeon* provides drill-and-practice in quadratic equations, it is not going to actually *teach* kids anything about the algebraic procedures necessary to solve them. She also pointed out that even the math whiz of her family had to get out his calculator for the more difficult levels of the game. She observed that there is no way to be sure *how* the child is solving the equations unless a parent or teacher is participating in the game. Parents might want to spend some time with their kids explaining the ins and outs of algebraic equations before turning them loose to explore the Dungeon. I did find that Beth's and my multiplication and division skills were noticibly sharpened (mine were not the best to begin with!) after a few rounds using pencil and paper. I hope to see more of this type of game from Timeworks; my younger kids could certainly benefit from a game like *Dungeon of the Algebra Dragons* at their own mathematical skill level.

The more I look at that Dragon, the more it reminds me of my own eighth-grade algebra teacher, who helped me escape from high school in spite of herself.

—BETSY BYRNE

FaceMaker

HARDWARE REQUIREMENTS: Apple II plus/IIe, 48K (disk); Atari 400/800, 48K (disk); Commodore 64 (disk); IBM PC, 64K (disk)
MANUFACTURER: Spinnaker
PRICE: $34.95



With *FaceMaker* it's simple to draw cartoon-like faces and animate them. Even a very young child can have fun making up different faces, changing their features, and making them do fairly elaborate things, though the lasting appeal of this package is likely to be greater for the younger half of the suggested age range (four–12).

After booting the disk, the child's first task is to create a face by selecting from various kinds of eyes, noses, mouths, hair, and ears. If you don't like the face, or if you make a mistake, it's easy enough to fix.

In itself, face building doesn't teach much. But in the second part

of the program, you animate the face you have created, constructing a simple program in the process. A face can be made to wink, frown, smile, cry, wiggle its ears, or stick out its tongue simply by pressing a letter. Combining letters into a string results in a sequence of actions. Like Spinnaker's graphics program, *Delta Drawing*, this constitutes programming at the simplest level. Since each action has its own sound, the effect is entertaining, particularly for young children. Predictably, at first the most-used option at our house was "stick out tongue."

A third option lets you play a game using the face you created. The computer makes the face do something and you guess what it was. A correct guess, and the computer repeats that action and adds one more—and so on until you either make an error or the computer runs out of room. The best score appears in the corner of the screen.

The creators suggest that this game "improves memory and concentration" and note that both "visual sequential memory" and "auditory sequential memory" can be employed during the game. Whether or not memory or concentration are improved is open to question; certainly no data are presented to bear out this claim. But there is no question that memory is used and exercised during the game.

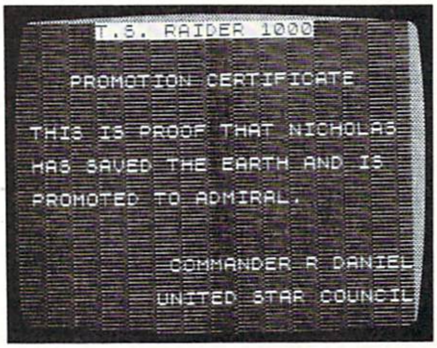
Overall, this package comes up a bit short. It *is* fun, but only for a while; kids don't show the kind of enthusiasm and magnetic attraction that indicates the package will stay in use for a long time. And the "learning" is modest—children "program" actions when they play Simon Says; and they exercise "sequential memory" when they describe a trip their school class took, the sights they saw while walking to school, or the things they did during the day. You don't need a computer to teach those skills, and it isn't clear that *FaceMaker* will significantly improve either "sequential memory" or programming skills. Purchase the software for fun and figure that any learning will be an extra dividend.

—TONY MORRIS

Math Raiders

HARDWARE REQUIREMENTS: TS 1000, 16K (cassette)
MANUFACTURER: Softsync
PRICE: $14.95

Your five-to-eight-year-old is the captain of a spaceship fending off an alien invader. The four weapons at his or her disposal are addition, subtraction, multiplication, and division. Here comes an alien invader . . . What are the firing coordinates?!! Your child might have to add 13 and 24, or multiply 14 by 3. Give the correct answer, and the alien will be destroyed; a wrong answer, and the alien will land.



Math Raiders offers a choice of skill levels—"easy" or "a little harder"—which accommodates improvement in your little math astronaut's skills. A correct answer is supplied even if the child's is incorrect. There are some cute touches, too, such as use of the child's name and promotion to admiral if he or she gives nine correct answers in a row. A certificate of promotion from a grateful galaxy is automatically printed out if you have a printer attached; otherwise it appears on the screen.

Some of the programming is a little clumsy: a few long pauses and one point where you can get stuck between menus because of unclear documentation. Also, the numbers in the math problems are all justified to the left. The equation 3×14 is displayed with the 3 under the 1 instead of under the 4. This causes a certain amount of confusion, even in my nine-year-old tester.

None of the kids who tested this game minded its lack of sound or color, or the relatively slow action. Perhaps kids aren't as jaded by fast-action Atari, Intellivision, and arcade games as we assume. This kind of interactive computer drill-and-practice was a novelty to them. They delighted at the gratification that came with typing a correct answer. And with its addition, subtraction, multiplication, and division problems, *Math Raiders* appeals to children of different ages and skill levels.

One last word: remember to keep paper and pencil handy and encourage the kids to use it to solve the equations. After all, how quickly (and accurately) can *you* multiply 14 and 17 in your head?

—SHARON AKER

Micro Mother Goose

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk); paddles or joystick required
MANUFACTURER: Software Productions
PRICE: $39.95

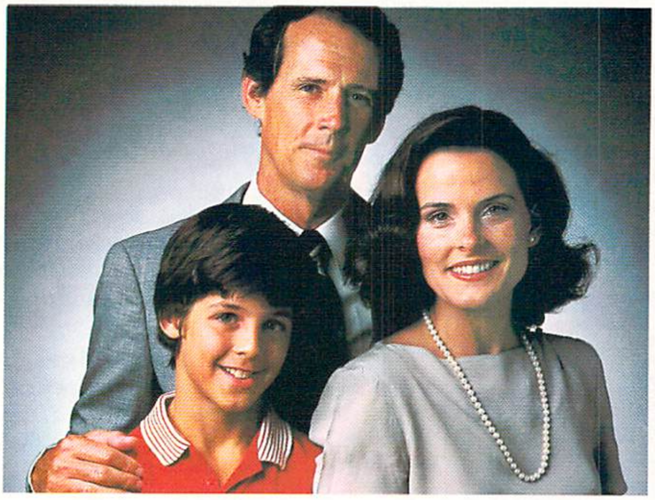
Intended for young children three to nine years old, this software package is like a lap dog—very friendly! From an opening observation in the documentation—that software for children "has a good chance of coming down with a fatal case of fingerprints or the 'peanut butter and jellies' "—you know that the creators live in the real world. In fact, the manual includes an entire section filled with practical nuts-and-bolts advice on introducing children to the computer and software. This makes *Micro Mother Goose* a particularly useful piece of software to take home with your first computer.

There are two kinds of programs in this package: nine familiar nursery rhymes such as "London Bridge" and "Old King Cole," and three basic arcade-type games. Although the manual suggests that the games and rhymes are related, the connection is remote at best. For example, "Splat" requires players to catch falling eggs in a basket before they reach the ground; if you're like me, you don't even want to think about how this might relate to Humpty Dumpty!

A hi-res picture, often with clever animation, introduces each rhyme, the words of which are then superimposed on the picture to the appropriate tuneful accompaniment. The manual suggests that you read the

Microzine™

from Scholastic



1. WHAT IN THE WORLD IS A "MICROZINE?"

Microzine is an interactive magazine on a computer disk, and it can open up the world of computer learning to your children *more effectively than any other children's software available today.* Microzine comes to you from Scholastic. We've been trendsetters in children's publishing for over 60 years. Now that traditional teaching methods are being enhanced by computer-taught materials, Scholastic is ready with the innovation that creates an ongoing "dialogue" of fun and learning between your children and your computer. Like a magazine, but unlike other software for children, Microzine is constantly current and topical. Your children receive a new four-program Microzine disk every other month and build their own Microzine Library! And each issue of the Microzine comes with an easy-to-use, step-by-step illustrated Handbook, to help your child get the most out of every Microzine software package.

2. WHAT CAN YOUR CHILDREN DO WITH MICROZINE?

Microzine can help your 9-13-year-olds take advantage of one of the most important uses your computer can have: exploring new and more efficient ways of learning and thinking. (If you don't own a computer, your children may be able to use one at school or a friend's home, or borrow one from your local public library.)

Microzine was created with the recognition that today's children take naturally to computers and that tomorrow's adults will need to be computer literate—no matter what their careers. With Microzine, your child will take enthusiastically to learning essential computer skills . . . and exploring the computer's wide-ranging capabilities.

3. WHAT ARE THE FIRST FOUR NEW MICROZINE PROGRAMS?

1. POSTER. What's two spaces wide, slow, green and silent—and changes to three spaces wide, fast, pink and squeaky? It's an imaginary paintbrush that lets you create as many colorful posters as you want!

2. SECRET FILES. If your children want to remember who starred in their favorite horse movie of 1982, they need Microzine's electronic filing system. It works just like the electronic systems adults use.

3. ASK ME. Robert Macnaughton of "ET" fame is standing by to accept questions—and ask a few of your children in return!

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rhymes aloud to your children and sing along with the music ("even if you think you have a voice as sweet as a frog's") while showing them how to use the software. This will be essential with younger children who cannot read the words to the rhymes or the instruction manual. It will also be necessary to show very young children how to play the games the first time or two.

The creators have gone to great lengths to make this package easy to use for even the youngest child. The menu uses a pointing finger that is operated by the space bar (easy for children to find and use). The rhymes and games listed on the menus are accompanied by visual symbols—a crown represents "Old King Cole"—so preschoolers can select nursery rhymes without being able to read the titles. At any time the ESC key returns young users to the menu, so they are always in control of the computer rather than vice versa.

Of course, the rhymes themselves are timeless and have lasting appeal. And the simplest game ("Lamb Scramb") is quick and easy to play. It has an intriguing surprise built in that makes the game suspenseful and fun for even the youngest player. The other two games start out easy, but they become more challenging as the child goes along. This ensures that they will appeal to a wider age range, adults included!

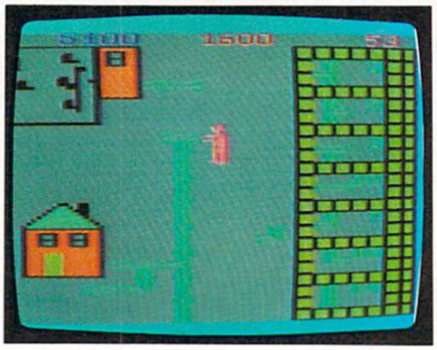
The graphics and music are a bit amateurish in places, but very young children won't notice this. "Mary Had a Little Lamb" shows only two of the four lines in each verse, so the music doesn't match the words. And "London Bridge-Out" goes very, very slowly when you are down to the last one or two bricks in the lower levels of play. I am also unsure just how much "learning" is going to accompany the "fun" in this package. Children will learn nursery rhymes (but they've been doing that for a long time without computers), and they will learn strategies for scoring high in the games (but that's true of tic-tac-toe as well). Perhaps the real value of this package is the extremely friendly and error-proof way it allows very young children to begin to use the computer and have fun while learning a bit—a combination that is still rather hard to come by in software today.

—TONY MORRIS

Pipes

HARDWARE REQUIREMENTS: VIC-20 (cartridge); Commodore 64 (cartridge), joystick required
MANUFACTURER: Creative Software
PRICE: $29.95 (VIC-20), $34.95 (Com. 64)

One of the best games for children to come down the pike in some time, *Pipes* doesn't fit snugly into any of the usual categories we often associate with computer games. It's not really an action game, although it requires a joystick. It's certainly not an adventure game, but it does encourage problem solving. And even though it's billed as a "concept home education program," it still isn't what I think of when I hear the term "educational software."



Pipes is a game in which the player controls a little plumber, who must lay pipe to connect all the houses in town to their new water supply, a water tower. He must go to the factory, choose one of 17 different pipes (straight or elbow pipes, valves, etc.), purchase it, and carry it back to the pipeline and connect it. When the line is finished, he has to turn on the valve at the water tower, hoping that there won't be any leaks.

My four desert-raised children were fascinated immediately! Our seven-year-olds got into the spirit of things right away, littering the landscape with pipes that they had removed from the factory only to decide that they didn't quite fit together. After Beth (14) pointed out that the pipe was costing them money and that there was a limited amount of both money and pipe available, they sat down to think about this new "game" in a different light! It was wonderful to see them realize how a particular shape would route the pipeline in a corresponding direction. When five-year-old Molly finally got a turn, she pointed out to anyone who would listen that the plumber had a map at the top of the screen, showing houses that were out of sight beyond the "edge of the world." (The program incorporates sideways scrolling.) *Pipes'* screen graphics are excellent, and the sound effects realistic.

The only thing I can fault this program on is its ending. It can take as much as an hour for your little plumber to complete the pipeline and get the water turned on, a long time for a young child to spend on such intensive play (although Timmy and James get so involved that they don't seem to notice the time passing). *Pipes'* ending just doesn't give the sound and graphic reward I or my kids expected—an ending of which the programmers were clearly capable. But after a bit of disappointment with the first few games, we learned to take pleasure in the fact that, thanks to us, all the people in town had a steady supply of water, and that we had done it with money to spare. In a dry place like our city, Albuquerque, New Mexico, that's nothing to sneeze at!

—BETSY BYRNE

Turtle Tracks

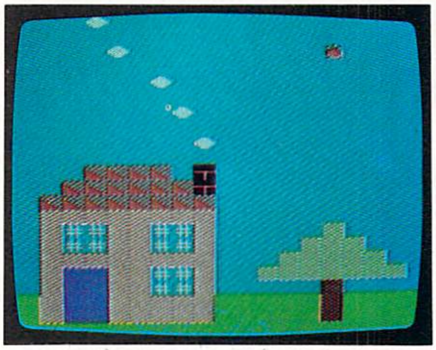
HARDWARE REQUIREMENTS: VIC-20, 8K (cassette); also available for Apple II plus/IIe, 48K (disk); Atari 400/800, 24K (cassette); Commodore 64 (disk)
MANUFACTURER: Wizware/Scholastic
PRICE: $39.95

"That turtle must be wearing fancy jogging shoes!" one of the kids quipped. "His tracks look like asterisks." This turtle has quite a collection of footwear—with a few simple commands you can make it leave any of more than 100 different kinds of tracks, in any of several colors. If that isn't spectacular enough, another simple command or two and each step it takes produces a musical note. March it along to a Sousa favorite or waltz to the accompaniment of one or another of your favorite composers. You can even create your own compositions.

To get the turtle to strut its fancy stuff, you have to write programs, but don't panic, this is pretty easy. To tell the turtle to move forward five steps, the command is simply DF5 (draw forward five); TR is turn right; TL is turn left; and JF5 (jump forward five) lets you move the turtle from one spot to another without leaving any tracks. With just those

four commands you can draw almost any design you want, and the limited set of additional commands will simply enhance the elegance and style of your creations.

The manual is well-written and will guide you through the learning process gently and with good humor. For anyone who has done any programming in BASIC at all, this will be a piece of cake. If you haven't, you will be ready for BASIC after a little practice with *Turtle Tracks*.



This is the first time I ever really wanted a printer for my VIC-20. The possibilities for greeting cards and decorated correspondence intrigues me. (Make it a color printer, please.)

With a name like *Turtle Tracks*, it's inevitable that comparisons will be drawn with the celebrated language LOGO. Underneath its shell, the VIC-20 version of *Turtle Tracks*, is quite a different beast. It is neither as complex nor as comprehensive as LOGO. It is, however, satisfying and delightful for itself.

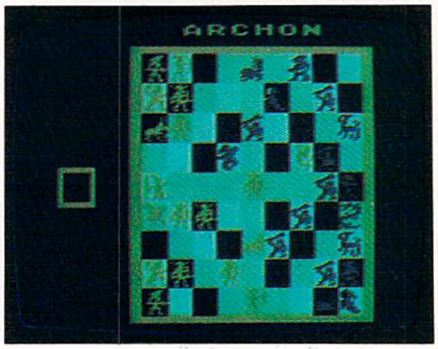
—DAVID WILSON

GAMES

Archon (strategy/skill)

HARDWARE REQUIREMENTS: Atari 400/800/1200, 32K (disk); IBM PC, 64K (disk); Commodore 64 (disk); Apple II/IIplus/IIe, 48K (disk); joystick required
MANUFACTURER: Electronic Arts
PRICE: $40

The armies of light are aligned against the armies of darkness. Like chess, different combatants have different powers, some more magical than others. Wizards and sorceresses cast spells. Shape shifters alter form with each skirmish. Phoenixes burst into flames, scorching nearby opponents, while djinnies (a.k.a. genies) whirl about the battlefield, sweeping up trolls and manticores in their path. Basilisks and banshees, golems and goblins—a fantastic menagerie divided in two and pitted one side against the other.



Archon is an exciting, colorful program—an introduction to what should be the next generation of adventure/strategy games. Combining the careful tactical maneuverings of chess-type board games with the arcade thrills of shoot-'em-ups, it's the first game to satisfy the appetites of both serious armchair strategists and their arcade-oriented brethren. Even children older than eight can get as much fun out of this game as their elders if matched against opponents of the same skill level.

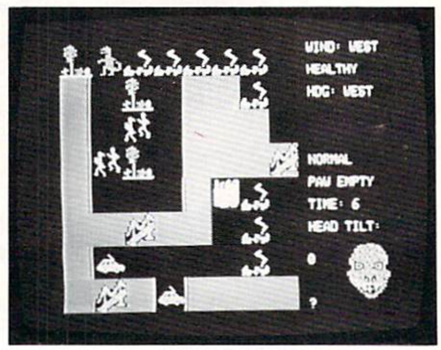
Archon can be played solitaire against the computer, or as a two-person match in which a serious edge in hand-eye skills makes all the difference, regardless of strategic know-how. Lacking any sort of handicap to accommodate for varying skill levels, novices will require hours of experience and self-inflicted, repeatedly induced losses of playing pieces in order to achieve a really good match either with the computer or a more fearless opponent. Nevertheless, *Archon* represents a real achievement in the game field—a significant step above the hundreds of repetitive skill and strategy games available on the market today.

Almost everyone who play-tested *Archon* came back for more. One session involving seven players turned into an all-night round-robin tournament. The graphics proved difficult for some players to follow at first (character identification is purely visual, and the small figures aren't easily distinguishable from one another). But with time, characters were more easily recognized. The novelty and strength of *Archon* lies in its unique, double-edged gaming system: players maneuver their pieces on a nine-by-nine square board until two pieces occupy the same square. Then a battle board appears, on which the two pieces fight out their duel until one is eliminated. It's reminiscent of the chess game that R2-D2 and Chewbacca played in *Star Wars*. *Archon* is a game for all ages, and will be regarded as a ground-breaking program in the history of computer games.

—JAMES DELSON

Crush, Crumble and Chomp! (arcade/strategy)

HARDWARE REQUIREMENTS: Apple II/II plus/IIe, 48K (disk); also available for Atari 400/800, 16K (cassette), 32K (disk); Commodore 64, VIC-20, 16K (disk or cassette); IBM PC, 64K (disk)
MANUFACTURER: Epyx
PRICE: $40



You're the beast in a late-night monster movie. Playing the role of a monster like Godzilla, or The Blob, you tear through your choice of cities (New York, San Francisco, Washington, Tokyo), dining on humans, leveling monuments, bridges, and buildings in your path. Constantly in search of sustenance, you must evade pursuing police cars, army tanks, and helicopters. Civilians flee while intrepid National Guardsmen and other military units stand and fight, ultimately bringing about your untimely end. Score points by overcoming your opponents, destroying power stations, or laying waste to whole neighborhoods. Like the monster movie genre that gave birth to this game, *Crush, Crumble and Chomp!* is chock full of death and destruction. It will certainly appeal to gamesters who think that's fun. With one person punching the keys to activate the monster, and others

WHAT'S IN STORE
SOFTWARE REVIEWS

shouting to look out for the National Guard or to zap an oncoming helicopter, a game can even begin to sound like a fifth-rate horror film.

Play testers of all ages respond well to this game. Although children need adult supervision at first, they soon learn what keys perform which actions and wander off on adventures by themselves. Another feature is the ability of players to create their own life forms from a menu of monster parts. With that option you can really tear up the town!

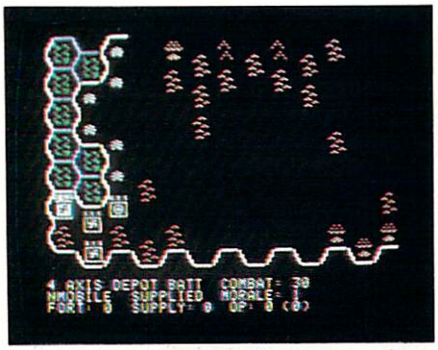
—JAMES DELSON

Knights of the Desert (war game)

HARDWARE REQUIREMENTS: Apple II/II plus/IIe/III w/emulator, 48K (disk); also available for Atari 400/800/1200, 40K (cassette), 48K (disk); Commodore 64 (disk or cassette); TRS-80 I (level 2)/III, 16K (cassette)
MANUFACTURER: Strategic Simulations
PRICE: $39.95

The time: 1941. The place: the gritty, barren battlefields of North Africa. Not such a great place to be, but as General Erwin Rommel, also known as "The Desert Fox," Hitler's leading practitioner of armored warfare, you have a job to do. You've been sent to destroy the Allies' weakened forces along the Mediterranean Coast and to seize the Suez Canal, cutting off their supply route to the East. Using blitzkrieg (lightning warfare) tactics, you overwhelm them in combat, utilize their own supplies to press your attacks, then go on to occupy their towns and fortresses. As you advance, you must string out your own meager supply lines. But beware of the famous "Desert Rats," those long-range British patrols that plague your vulnerable areas. Act quickly to prevent the Allies from regrouping and launching counterattacks; given the chance, they'll take back all you've conquered and force you off the continent.

A moderately difficult game for experienced war-gamers to master, this will be a true test for novices. As an accurate simulation of the North African campaigns of 1941–42, *Knights of the Desert* offers many of the thrills to be found in conventional war games, and suffers from only a few of the faults that have so limited that market for the past 20 years. *[See Games, p. 23.]*



Suitable for dedicated gamers ages 12 and up (including those who have never played war games before), *Knights of the Desert* requires patience and clear thinking in order to read and fully comprehend the sophisticated rules, charts, and tables provided with the software. Though both solo- and two-player versions are offered, the player-against-computer scenarios proved more popular, taking only half the time to play because the computer acted so quickly. Even so, several games lasted more than 30 hours! The program offers a variety of play balance options, allowing the game to be adapted to varying skill levels.

War games are not for everyone. Some may object to their violent nature, or in this particular case, the reenactment of a Nazi military triumph. But like chess, these games might best be regarded as strategic scenarios. They build patience, stretch your mind, and organize your thoughts more efficiently through the necessities of carrying out a military campaign. Although *Knights of the Desert* might not appeal to everyone, for gamesters with the appropriate interests and skills, it is a provocative and mind-stretching experience.

—JAMES DELSON

President Elect (political role-playing)

HARDWARE REQUIREMENTS: Apple II/II plus/IIe/III w/emulator, 48K (disk)
MANUFACTURER: Strategic Simulations
PRICE: $39.95

It's Labor Day in a presidential election year. As your party's candidate, you have nine weeks to persuade the country that you should be our nation's leader. Buy advertising time and schedule personal appearances around the country with campaign funds. Spend too much money early on and you may run dry in the closing weeks of the campaign. On the other hand, hold back your resources for a blitz at the end and you may find yourself too far behind to catch up with your opponent. Be prepared for a compelling, stomach-churning experience if you play seriously.

This absorbing political role-playing game offers virtually endless variable scenarios to the solo gamer playing against the computer, or to any number of players or teams playing among themselves. Choose from seven different election years (1960–84), with candidates of your own creation, or politicians picked from a list of 22 Republican, 21 Democratic, and two "Third Party" candidates preprogrammed on the game disk. The election years are limited, but by choosing your own opposing tickets (Robert Kennedy vs. Richard Nixon in 1968, Jesse Jackson vs. Ronald Reagan in 1984) the possibility of duplication is practically impossible.

Apart from the obvious elements of fun and excitement, a major selling point for this game is its inherent educational value. Parents can show their children the variations of the American political system, why and how it works, and how it can be abused. You can agree to debate, get credit for it, then back out at the last minute without losing face.

Like Sir-tech's *Wizardry*, this program has the potential of being as sophisticated as one chooses. Simple, straightforward gamesmanship will result in short runs of about three hours. But as one becomes more Machiavellian—scheduling numerous public appearances, carefully managing campaign funds, pulling all the other political tricks one can muster—it's conceivable that the game could last an entire weekend.

President Elect has one serious program bug. There is no allowance for changing your mind once you've input information, no way to back out of mistyped instructions. If, by accident, you hit the wrong key, that's that. True to life? Perhaps. But the results of one serious mistake can be disastrous. I lost California in the last week of my '68 campaign when I accidentally hit the wrong key!

—JAMES DELSON

WHAT'S IN STORE BOOK REVIEWS

Elementary BASIC
Henry Ledgard and Andrew Singer
Random House, 1982
264 pp., softcover, $12.95

A famous art dealer is mysteriously murdered at a posh London club. A baroness disappears without a trace while visiting a seaside resort. Puzzles like these provide the context for a unique introduction to programming in BASIC with the great puzzle solver himself, Sherlock Holmes. Written in the style of Arthur Conan Doyle's mystery novels, *Elementary BASIC* describes how Holmes and his colleague, Dr. Watson, use the analytical engine (an ancestor to the present-day computer) and BASIC programming to untangle each of several mysterious cases.

The programming style is meticulously clear. Each chapter concludes with a discussion of the problems, commands, and ideas used to construct the programs. Variables are defined, and the format in which each program command is typed is carefully outlined.

The text is well written and makes for fine recreational reading for those already familiar with some programming language. But it is not recommended for the newcomer. For one thing, there are no problems for the reader to solve; all learning comes through study of the examples provided. Like riding a bicycle or skiing, programming must be learned by doing.

Elementary BASIC is thoroughly enjoyable. While creative minds might view it as a turnoff, analytical ones will appreciate the rigorous adherence to structured programming. I believe the book is most appropriate for those who have already had experience using BASIC.

—WALTER KOETKE

The Fifth Generation
Edward Feigenbaum and Pamela McCorduck
Addison-Wesley, 1983
275 pp., hardcover, $15.55

The term "fifth generation" refers to the most recent and powerful kind of computers being developed in the most advanced computer labs around the world. *[See Computing Clinic, p. 48.]* Using the technology of artificial intelligence, fifth-generation computers will reason through, rather than simply process, information as today's computers do. *The Fifth Generation* describes how Japan has begun a full-scale campaign, a "10-year plan" involving a coalition of government and private industry bent upon developing this advanced technology. It alerts readers to the implications of that effort, the challenge it could pose to economies reliant upon superior computer technology.

Authors McCorduck and Feigenbaum skillfully introduce the concept of artificial intelligence. They suggest ways in which the U.S. might strengthen its diminishing lead in the field. Speculations are cautious and framed by reasonable evidence of current national and corporate policies regarding computer technology. But their discussion of how the U.S. might better compete with Japan suffers from too much personal opinion; too many beefs with too many attorneys, politicians, corporations, and public policies obscure what should be a level-headed analysis.

The U.S. can't afford to yield its present edge in computer technology as the fifth generation of computers emerges. Fascinating and well-researched, *The Fifth Generation* clearly shows how the very old adage, "Knowledge is power," has become more significant than ever before.

—WALTER KOETKE

Your First BASIC Program
Rodnay Zaks
Sybex, Inc., 1983
187 pp., softcover, $9.95

Your First BASIC Program is the latest in a long series of excellent releases by Sybex, Inc. As president of Sybex, as well as author and publisher of this superior introduction to BASIC, Rodnay Zaks has lent further credence to the old saying, "If you want something done right, do it yourself."

Mr. Zaks—the publisher—has wisely camouflaged his text with all the regular accoutrements of the standard BASIC primer: cute illustrations (the hero of the book is a dinosaur), continual gentle reassurances, playful examples, and so on. Mr. Zaks—the writer—has worked hard to ensure that any resemblance between *Your First BASIC Program* and other typical BASIC primers is mostly cosmetic. Most beginner BASIC books use attractive features to conceal a slapdash, ill-organized, patronizing, and superficial approach to their subject. But *Your First BA-*

Advertiser Index

WHAT'S IN STORE
BOOK REVIEWS

SIC Program uses them to flavor an otherwise complete, concise, simple introduction to programming concepts in general, as well as BASIC language specifically.

Zaks's work contains all the essentials of a good introductory BASIC book: a clear definition of general concepts, a thorough examination of the BASIC language, the presentation of several practical examples, and an emphasis on good programming technique and program structure. A separate chapter, "A Case Study," takes the reader through the process of planning and developing a BASIC program from the start to finish—an unusually rigorous and realistic treatment. —JOHN B. JAINSCHIGG

VIC Revealed

Nick Hampshire
Hayden Books, 1982
267 pp., $12.95

It seems that there is at least one person in every family who takes to programming like a duck takes to water. No matter how many times it is pointed out that there is so much great software available that you don't need to write your own stuff, someone like my husband Dan will insist on taking a do-it-yourself attitude. More often lately, among families we know, the do-it-yourselfer is a youngster or a teenager.

So where can they turn to find intermediate- and advanced-level information about the computers they are working on? *VIC Revealed*, although it is not an instruction book, is a veritable mine of information about the inner workings of the VIC-20. It contains an excellent set of operating system maps, and gives a very detailed description of the operating system and its capabilities. For at least a week after we purchased *VIC Revealed*, I heard my husband muttering (sometimes even shouting) things like "I didn't know it could do that!" and "Honey! I *finally* found out how to . . ."

Hampshire gives a detailed description of the VIC's cassette I/O (input/output), with an emphasis on extending the computer's home applications. He gives machine-language subroutines for sound and graphics, and explains how to use them in BASIC programs.

Nick Hampshire really seems to know his computer inside and out; there is a real need for more books like *VIC Revealed*. —BETSY BYRNE

THE PRIMER

The Primer will appear in every issue of FAMILY COMPUTING. You might look to it for "Everything You Always Wanted to Know About Computers but Were Afraid to Ask." New information will be presented periodically, and existing sections will continually be adapted and updated. Whatever the format, the Primer is a handy reference guide to shopping for, setting up, and using a computer.

The only way to learn to use a computer is to use one. But before you start, it's well worth asking, "What can I do with a computer?" And, "How does a computer work?"

The illustration of a computer system on the opposite page shows various pieces of equipment, referred to as hardware. To work effectively, this hardware needs step-by-step instructions, or programs. These programs are often called software. What you can do with a computer depends on the software you use.

The many uses of home computers can be broken down into several broad categories.

WHAT A COMPUTER DOES

Game Playing. Several types of games are available—arcade-style action, fantasy, adventure. Some take minutes to master; others months. Many games can be played by more than one person at a time.

Education. Whether you are learning math, French, history, or typing, these programs allow you to learn at your own pace. Programs range from question-and-answer drills to loose creative exercises. Some test logical skills, by putting you in a real-life problem-solving situation; others teach you to program by letting you draw pictures.

Paper work. When it comes to handling reams of information, the computer can't be beat. It functions as an endless supply of paper, file cabinets, and a calculator rolled into one. With an electronic spreadsheet, you can change one figure in a budget and the rest will automatically change. The ability to ask "what if?" and see immediate results has obvious time-saving benefits.

The computer is equally adept at setting up a filing system, and allows you to cross-reference data in any number of ways for easy recall.

With a word-processing program, the computer can speed up and simplify the writing process, by allowing you to change or rearrange words and paragraphs without retyping.

Information access. You can hook your home computer, via the telephone, to much larger computers at "information service" companies. This allows you to "call up" stock quotations, airline schedules, newspaper and magazine bibliographies, encyclopedias, and even games.

Also, by using the telephone lines you can hook your computer to other home computers around the country, and leave or receive messages. This practice is known as electronic mail. Several computers linked together are called a network.

Programming. It's possible to enjoy practical benefits from your computer without ever buying a commercial program—you can write your own. And, in some cases, you can adapt commercial programs to better suit your particular needs.

HOW A COMPUTER WORKS

The computer is an information-handling machine. It stores, compares, changes, and manipulates information of almost any kind at tremendously high speeds.

The computer's operating method can be boiled down to four simple steps. (1) INPUT: Instructions and information, in the form of a program and data, are entered into the computer. (2) PROCESSING: The computer executes the steps of the program. (3) OUTPUT: The results of the computer's work are made visible and available to the user. (4) STORAGE: Results can be stored and saved.

Most home computers do not come ready-made in one piece, but must be assembled from various components. Following are the components needed for each of the four operating steps, and how they work.

Input. There are four basic ways of getting a program and/or other information into a home computer.

KEYBOARD. The keyboard looks and behaves much like that of a typewriter. Some keyboards have special keys for certain computer functions, and some have a numeric keypad, much like a calculator. But on any unit, every keystroke you type goes directly into the computer's memory. That information will stay there until you delete it or turn the computer off. (You can also store, or save, that information for future use.)

CASSETTE TAPE RECORDER. You can copy a program stored on a cassette tape directly into the computer's memory. Regular tape recorders and cassettes can be used with most home computers, although you will need a special cable to connect the two. Once connected, you merely type a simple command to transfer the program from tape to computer.

DISK DRIVE. The transfer method is much the same with a disk drive, except that the program is stored on a floppy disk, which looks much like a 45 rpm record.

The disk drive enters programs much more quickly and with less chance of error than the cassette recorder. But the cassette recorder is significantly cheaper.

CARTRIDGE. A cartridge, which plugs into a slot built into some computers, also stores programs. Putting a cartridge into a computer actually adds memory to the computer—and that memory contains a program.

Processing. All input goes to the Central Processing Unit (CPU), located underneath the keyboard. The CPU is a maze of tiny electronic circuits, but it functions as a giant.

The CPU controls the flow of information into, out of, and inside the computer. The computer's memory, where information is stored, is located in the CPU. The CPU also interprets a program, performs each of its steps, and then sends the results to the user.

Output. The visible result of a CPU's work is called output. Output is made available on the screen of a

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After that, it's merely comparable to other printers that can cost up to three times as much: 10″ carriages (to handle standard 9½″ paper), 80 columns, graphics capability, 10 characters per inch (expandable to 5 cpi) draft-quality print (for perfectly acceptable form letters, data processing, business reports, etc.) tractor feed (for precise alignment and quick loading), parallel or serial interface (take your pick), self-inking ribbon cassette (for long life and easy installation), 10 portable pounds in weight, and compatibility with so many of the most popular personal computers on the market.

Plus its printhead features a unique single-hammer design that eliminates a lot of moving parts, to eliminate a lot of annoying repairs.

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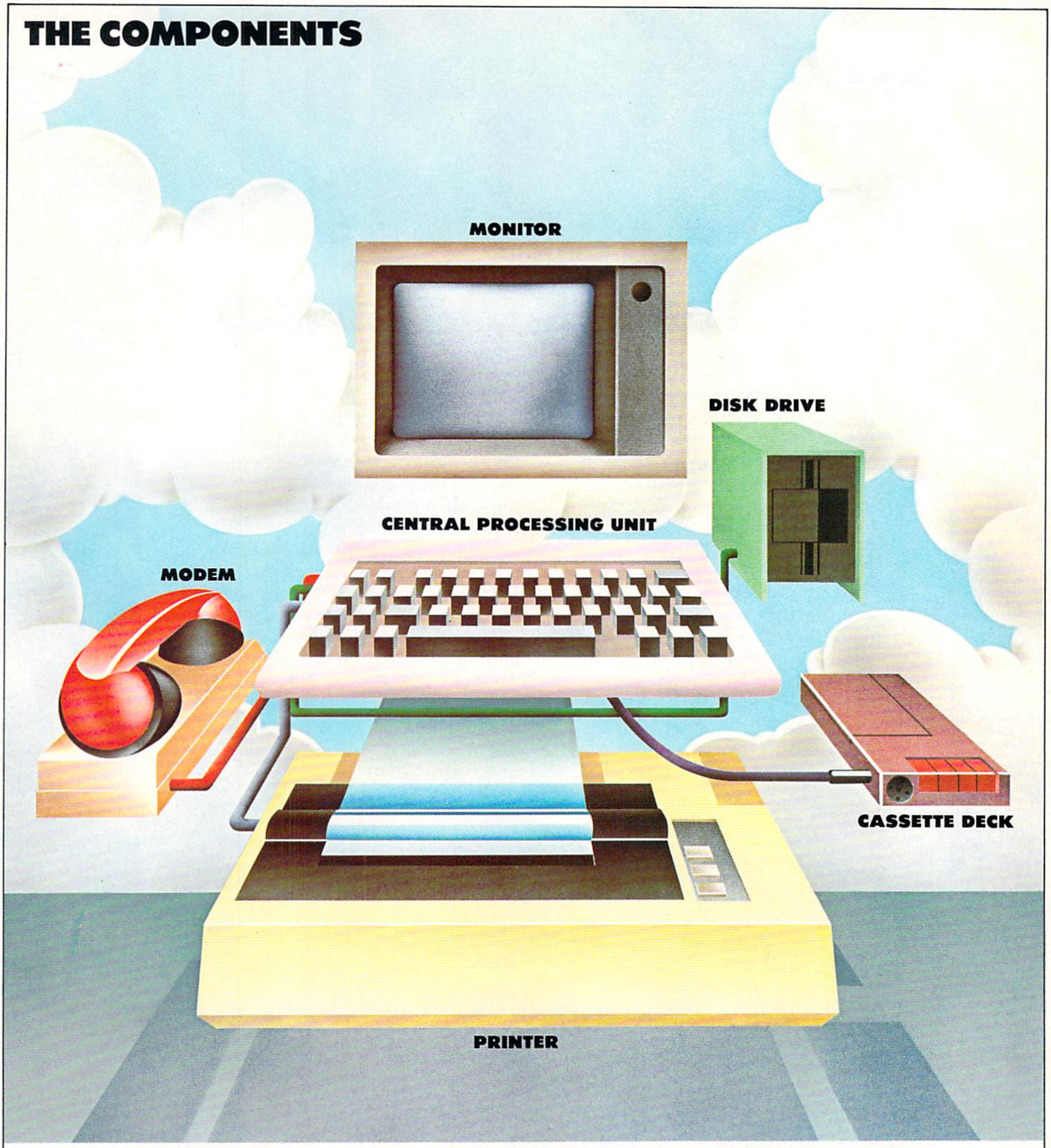
THE COMPONENTS



TV or monitor, or from a printer.

Computers can be hooked to TVs or monitors, and to printers. In all cases special cables are required. In general, the monitor's screen display is sharper than the TV's.

Storage. When the computer is turned on, it will store and remember all information it receives. But when it is turned off, this information will vanish—unless you instruct the computer to save it.

You can store information on a blank tape or disk. Either way, you can record the results of the computer's work, just as you would record a speech. Then, any time you want to run that program again, you can transfer it into the computer's memory, and see it on the display screen.

You cannot store new information on a cartridge.

Peripherals. Peripherals are optional pieces of equipment that can be added to your computer, but are not crucial to the computer's operation., A printer, in fact, is considered a peripheral. One of the most popular peripherals is a modem.

MODEM. If you want to link your computer to an information service or other computers, you will need a modem. A modem holds a telephone receiver and transmits and receives data through phone lines.

Remember that the computer is a tool. As with all tools and machines, there is no need to know everything about how a computer works. All you need to know is how to use it for your own purposes.

ILLUSTRATIONS BY ROBERT TIMPERIO

HELENA ON CREATIVITY.

Name: Helena Paoli
Age: 9
Home: Belvedere, California
School: Bel Aire
Hobbies: Drawing, playing with dolls, reading, swimming
Ambition: To be a fashion designer
Favorite software: Creature Creator™ by DesignWare

"I like *Creature Creator* because it's kinda like drawing—only the pictures are alive! I can make different creatures, and then make them do lots of different dances.

"Lots of games—well, you just keep shooting or dodging things until you learn the pattern. Then you can beat it easily, and you get bored.

"*Creature Creator* lets me use my imagination. Now a couple of kids have it, so we get together to compare the creatures and monster dances we've made."

DESIGNWARE ON CREATIVITY. Children learn the most through creative problem solving. That's why *Creature Creator,* like so many DesignWare games, is an open-ended exercise that challenges and nourishes young minds. In a way that's a lot of fun.

DesignWare programs go far beyond putting a sugar coating on rote drills; they encourage kids to draw on something they just happen to have an unlimited supply of—imagination!

SPELLING, MATH, OR LANGUAGE. Games like *Creature Creator, Spellicopter™* and *Math Maze™* inspire youngsters to tap into that fertile idea-field. To actively become part of the program, in effect creating "new" games as they go along. And all the while building up solid skills in the basics. And all the while having a lot of plain old fun.

DesignWare. We make learning come alive. On Apple II,® IBM® and Atari® computers.

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As Helena Paoli says, "Mom, Dad—look what I've created now!"

DesignWare™
LEARNING COMES ALIVE

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THE PRIMER
THE SETTING

It takes care to shop for a computer. It takes still more care to set it up properly. Reading the directions thoroughly is important. So is common sense. Today's personal computers may be sturdy machines, designed for many hours of use, but they can also be sensitive and finicky. Here are six steps to get you off and running.

1. Setting Up

When you open the box, check the manufacturer's packing list (or manual) to make sure you have all the parts. If you don't, call the store immediately.

Set the computer in an area that won't get a lot of traffic. And keep in mind that the computer will function best at normal room temperature. In unusually cool or damp rooms, such as an unheated basement, the computer will need some time to warm up.

Keep the surface around the computer clear, so the machine can get good air circulation when working. Even those machines that have interior fans need air movement to keep from overheating.

As with a TV, position the monitor away from sunlight glare, which can cause eyestrain. And, if you have a printer, try to place it on a separate table, so that its vibrations don't jiggle the computer.

2. Beware of Static

If the computer room has a rug, beware of static electricity. Small doses of static can cause the computer to speak gibberish; large doses may cause real damage. Static electricity is most likely to build up in winter months, when rooms are hot

It's still around if you know where to look.

We are Kangaroo™ Inc., dedicated to just plain fun for kids 3 to 8 years old.

Jeepers Creatures™ - 30 basic animals with interchangeable heads, torsos, and legs or tails. Create an owligator or an octo-catfish or one of over 26,000 funny colorful combinations in this goofy collection of mixed up animals.

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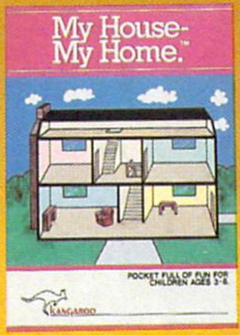
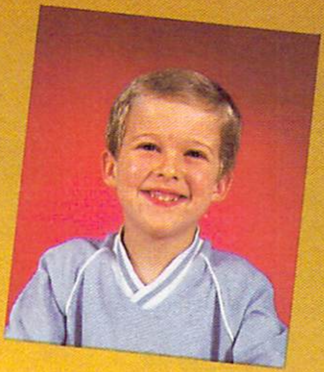
Jeepers Creatures and My House-My Home have no winners or losers, no right or wrong answers, no high scores to beat, just hundreds of hours of creative play.

Give your child's imagination a boost with Kangaroo games designed for Apple and Atari computers.





Jeepers Creatures and My House-My Home are each available for $34.95 at your software dealer or from Kangaroo, Inc., 332 South Michigan Ave. Suite 700, Chicago, IL 60604, (312) 987-9050. Visa, MasterCard and personal checks accepted.

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What ever happened to just plain fun?

THE PRIMER
THE SETTING

and dry, but it's easy to combat—just spray the rug with a mild mixture of fabric softener (such as Downy or Stay-Puf) and water. If the static recurs frequently, you may need a humidifier or static mat.

3. Plugging In

Buy a power strip, available from most hardware stores for around $20, to eliminate the massive tangle of cords and wires from your computer, video monitor, disk drive or tape deck, and other peripherals. You don't want small children or pets to bring the whole system crashing to the floor. And don't plug heavy appliances into the same outlet as the computer. When turned on they will cause a sudden drop in voltage, which may play havoc with the computer.

4. No Food or Drinks Allowed

Do not eat or drink near the computer and its accessories. Foreign substances, including spills, dust, and smoke, can destroy programs on cassettes and disks—and they will slowly wear down the computer, cassette player, or disk drive.

5. Safekeeping

To protect programs, keep all cassettes, cartridges, or disks in tightly closed boxes out of reach of small children and pets. The boxes should not be near magnets or magnetized tools, which may erase programs. Disks are especially sensitive (more so than records), and can be ruined by a thumb print. Treat them gingerly, as if they had a "Wet Paint" sign on them. Valuable programs should be copied and stored elsewhere, as a form of insurance. The owner's manual will explain the copying process.

6. Read Before You Leap

Before using the computer, read the manual carefully. Even though you can't do the computer much harm by experimenting with the keyboard, you will save some initial frustration by memorizing basic instructions. It may pay to copy these instructions and tape them on the wall in front of you. In any event, keep the manual nearby, preferably on a shelf with your programs.

Don't worry about the whirring or clicking sounds the computer makes when storing or retrieving data. These are, after all, just the sounds of a machine with a giant memory at work.

THE PRIMER
SHOPPING DOs AND DON'Ts

Shopping for a computer is unlike any experience most of us have ever had. It's unnerving even to those who previously found shopping a form of recreation. In addition to the fact that most of us feel dumb and vulnerable when we walk into a computer store for the first several times, there's the fact that we are. Most first-time buyers know very little—even about why they want a computer. Few know much about the technology, its applications, or the specific products available. Many salespeople know little more.

There are a number of specific steps that will increase the comfort level in this tension-producing situation. Here are 10 shopping guidelines:

1. Figure out who in the family will use the computer, and for what purposes. When you shop, take along your list of these objectives and measure the computers you see against them. Take brochures home to read in your favorite chair.

2. Many experts say that after you decide why you want a computer, find out which software is best to accomplish that task and then find the hardware it fits. Don't start the other way around, they advise. Sometimes shoppers get so caught up with the equipment, they don't pay enough attention to the software. But the greatest computer in the world is not much use without the software you want.

3. Ask plenty of questions. Ask the same questions of different people. Then ask more questions. Don't be afraid of appearing "stupid," because there's no reason you should know anything about computers. Make sure you get answers you understand. Don't be intimidated by jargon. The person using it may not know much more than you do. To meet people who are using the computers you are considering, attend a local user-group meeting.

4. Be sure you know what you're getting for the money. You need more than just the keyboard unit, which is what most advertising refers to. You also need a cassette recorder or disk drive to run programs, and a monitor or TV to see what's going on. And, if you want copies of your work, you'll need a printer. Many of these add-ons cost more than the keyboard unit itself. If you're buying peripherals, ask about what you need to hook them up and get them working. There are lots of extra costs, and not all salespeople volunteer this information.

5. Demand a demonstration, and try out any computer you're thinking of buying. Finding a comfortable keyboard is important—pretend you're testing a new car.

6. Read magazines to see where the industry—and any computer you're considering—is heading. You want to make sure you'll have an array of software and equipment to choose from in the future. In this regard, be wary of promises made by manufacturers or retailers about forthcoming products. They can take months to materialize; and the promises often vanish into thin air.

7. Discounts are great, but there's no such thing as a "free lunch." Though you pay more when buying from a certified dealer, you generally get better service. If you're buying from a department store or through mail order, find out where you have to take or send the computer for repair. Sending a computer to Timbuktu is no bargain.

8. Don't rush things. Take the time to comparison shop. As you learn more, your ideas about what you want will probably change.

9. One addendum to the last point. Don't wait for a state-of-the-art machine, unless you prefer twiddling your thumbs to exercising them on a keyboard. There are any number of reasonably priced computers on the market that will keep you and your family entertained and challenged for several years.

10. If you're having trouble finding a computer that satisfies the needs of everyone in your family, consider this option: Buy a low-end start-up computer for the children (or put their allowances toward it) and another more sophisticated computer that suits you. This is better, and not much more expensive, than buying a "compromise" computer that satisfies no one.

THE PRIMER
THE WORDS

The Words is a glossary of commonly used computer terms. Some are well-known English words, such as *read* and *write*, that have been incorporated into computer language and given different meanings. (Note: All italicized words in the definitions are defined in full elsewhere in the glossary.) Other terms that refer to a computer's inner workings are not often used in common speech, but are important because they are used in manufacturers' specifications and ads. Don't be awed by them. Remember the delight with which Americans took to the new NASA language over 20 years ago, when John Glenn first orbited the globe.

Access
To retrieve information from a storage place in the computer system. Access time is the amount of time it takes to obtain the information.

Address
A specific location in the computer's *memory* where a piece of information is stored. Each address is identified by a number.

Applications software
Programs that instruct the computer to perform one task or a group of related tasks, such as keeping track of a household budget, or the accounting and inventory of a business.

BASIC
Beginner's All-purpose Symbolic Instruction Code. A popular, easy-to-learn *programming language* widely used with *microcomputers*.

Baud
Bits per second. A unit of measurement that describes the rate at which *data* are transmitted from one device to another, such as computer to *printer*, computer to computer, or computer to *terminal*.

Binary code
A number system using only two digits, "0" and "1." Any number or letter can be expressed as a combination of these digits. Computers use the system by translating each *character* of information into a string of binary numbers.

Bit
The smallest unit of information a computer uses. A bit is either the digit "0" or "1." An "eight bit" processor manipulates *data* in clusters of eight bits.

Board
Printed circuit board. A flat, thin rectangular component of a computer that includes one or more layers of printed circuitry and to which *chips* and other electronic parts are attached. As an add-on to an existing computer, sometimes called a card.

Boot
Derived from "bootstrap." To start or restart a computer system by *reading* instructions from a storage device into the computer's *memory*.

Bug
An error in the logic of a computer *program* that prevents it from running properly. Bugs can cause a program to "freeze up," that is, to repeat the same operation endlessly. Finding and correcting the error is called debugging.

Bus
A device that connects components of a computer so that *data* can flow between them. There are several conventional buses that allow components made by different manufacturers to be used in the same computer.

Byte
One byte contains eight *bits*, enough to stand for one *character* of English, or one number. Thus, it generally takes more than one byte to make up a word. "Cat," for instance, requires three bytes.

CAI
Computer Assisted Instruction. A term applied to a wide range of instructional *software*, including drill-and-practice, simulation, and educational games.

Cartridge
A device that stores a prerecorded *program*. A cartridge is inserted into a special slot built into the computer. Also known as a solid state cartridge or *ROM* module.

Cassette tape recorder
Computer cassette recorders are usually the same as those used for audio recordings, but often need a special cable to connect them to the computer. They house and run magnetic tapes that either hold a prerecorded *program* or store *data* from the computer.

Character
A letter, number, or symbol.

Chip
A small (about the size of a child's fingernail) component that contains a large amount of electronic circuitry. Chips are the building blocks of a computer and perform various functions, such as doing arithmetic, serving as the computer's *memory*, or controlling other chips.

Command
An instruction that tells the computer to do something, such as to run a *program*.

Compatibility
The ability of different devices, such as a computer and a *printer*, to work together; or the ability of a particular *program* to run on a given computer. In short, the ability of anything in a computer system to work with anything else.

CP/M
Control Program for Microprocessors. A widely used *operating system* for microcomputers.

CPU
Central Processing Unit. The "heart" of a *microprocessor*, with components that control the interpretation and execution of instructions.

CRT
Cathode Ray Tube. A TV or TV-like *monitor* used to display information and pictures. Also called a computer screen.

Cursor
A symbol, usually a small square, that indicates where the next *character* will appear on the CRT screen.

Data
Information put into or taken out of a computer.

Data bank
A central location for storing vast amounts of information accessible by computer.

Data-base manager
A *program* that allows the user to enter, organize, sort, and retrieve information.

Disk
A magnetic device for storing information and *programs* accessible by a computer. A disk can be either a rigid platter (hard disk) or a sheet of flexible plastic (floppy diskette). Disks have tracks, much like grooves on LP records, where *data* is stored.

Disk drive
A device that *reads* information from a *disk* and copies it into the computer's *memory* so that it can be used by the computer, and that *writes* information from the computer's *memory* onto a *disk* so that it can be stored.

Documentation
The written instructions that explain how to use computer *hardware* or *software*. Also refers to all instructions and remarks, used to describe procedures when programming.

DOS
Disk Operating System. See *operating system*.

Downtime
Time when a computer is not working.

Electronic mail
The transmission of messages, documents, or other information from one computer user to another. This can be done over telephone lines using devices called *modems*.

Emulator
A *hardware/software* device designed to translate *programs* written for one particular computer so that they will run on another computer.

Firmware
Programs or *data* stored in *ROM*—either built-in by the manufacturer, or added with a cartridge—that cannot be changed by the user.

Flow chart
A diagram on paper that shows all the logical steps necessary to write a *program*.

Format
To prepare a *disk* so that it can receive and store information. Until you perform this task, the *disk* will not be able

THE PRIMER
THE WORDS

to store any information. The word "initialize" is often used to mean the same thing as format.

Function key
A special key on the computer's *keyboard* that has been or can be designated to perform a specific task.

Graphics
Pictorial displays on the *CRT*, such as charts, graphs, and symbols. Contrasted with *text*.

Graphics tablet
A kind of electronic drawing board. With a graphics tablet and a special pen, whatever you draw will appear simultaneously on the *CRT*.

Hard copy
Information printed by the computer onto paper.

Hardware
The physical, nonchanging parts of a computer system. Contrasted with *software*, or *programs*, which can change.

High-level language
A *programming language* that resembles an ordinary spoken language (e.g., English). *BASIC* is a high-level language.

Input
Programs or *data* entered into the computer.

Interface
An electronic connector between the computer and its *peripherals*.

K
Abbreviation for kilo, or 1,000. When used to describe the amount of *memory*, or storage space, a computer has, it often signifies 1,024. A computer with 16K *bytes* of *memory*, for example, can store 16,384 *characters* of information.

Keyboard
Designed much like that of a standard typewriter, the keyboard is used to enter information into the computer.

Load
To enter a *program* from an external storage device into the computer.

Information services
Broad-based *data bases* that offer a variety of services, ranging from airline reservation information to stock market quotations. You need a *modem* to link up with such a service.

LOGO
A *programming language* that allows the user to draw pictures on the screen. LOGO is particularly good for teaching young children how to *program*.

Loop
A statement in a *program* that instructs the computer to repeat a certain task.

Machine language
A binary code consisting of "0s" and "1s," which is the only language a computer understands. *Programs* written in any other language, such as *BASIC*, are translated into machine language for processing.

Membrane
A type of computer *keyboard* with a flat, smooth surface.

Memory
The place in a computer where *data* and *programs* are stored.

Menu
A list on a *CRT* of the operational options of a computer *program*; a list of programs stored on a tape or *disk*.

Microcomputer
A small computer designed primarily for home or small business use. The micro can do today what many room-sized mainframe computers did 20 years ago.

Microprocessor
A tiny processor on a single *chip*. The "brains" of all *microcomputers*, it is also found in many consumer and industrial products.

Modem
A contraction of Modulator/Demodulator. A device that makes it possible to transmit and receive computer *data* over telephone lines.

Monitor
A device for visually displaying a computer *program* or the results of that program on a screen. See *CRT*.

Network
A system of linking computers so that users can share resources and exchange information.

Operating system
A *program* that controls the operation of a computer system, such as controlling signals to the *disk drive* or *printer*. When a computer system is turned on, the operating system is the first program executed. All subsequent programs are loaded and supervised by the operating system.

Output
Computer-generated information that is transferred to a *monitor*, *disk*, tape, or *printer*.

PASCAL
A *programming language* that can be used on many *microcomputers*. While it is considered more difficult to learn than *BASIC*, it can generate *programs* that run faster and use less *memory*.

Peripherals
Hardware accessories for a computer, such as a *disk drive*, *printer*, or *modem*.

Pixel
Stands for "picture element." A single dot of light on a TV screen or computer monitor. These tiny elements are used to create electronic pictures, or *graphics*.

Plotter
A machine, attached to a computer, that prints lines or graphs on paper.

Printer
A machine that transfers information stored in the computer onto paper. Two of the most commonly used printers are: dot matrix—a printer that forms *text* or *graphics* using a group of individual points (dots); and letter quality—a printer that prints fully formed characters (like a typewriter), using a type element called a "daisy wheel."

Program
A set of step-by-step instructions that tells a computer how to solve a given problem. Also, to prepare such a set of instructions.

Programming language
A language, with clearly defined rules, that can be used to express a computer *program*.

RAM
Random Access Memory. An area in the computer where information is stored. When called into this area, information can be *read*, changed, or edited. However, it will be lost when the computer's power is turned off, unless you first *save* the information.

Read
The process of copying information from a storage device (such as floppy *disk* or tape) into the computer's *memory*. Reading only copies; it does not erase the *data* from where it is stored.

Resolution
The sharpness of a picture on a *CRT*, usually described as "high" or "low." The higher the resolution, the sharper the picture. Resolution is expressed by the number of *pixels* in the display. For example, 560x720 is much sharper than 275x400.

ROM
Read Only Memory. Permanent *memory* built into a computer by a manufacturer. The information stored here gives the computer operating instructions when it is first turned on. The user cannot change this memory, but "only read" it.

Save
To store information from *memory* on tape or *disk* so that it can be used again.

Software
Computer *programs*. Also, tapes and *disks*.

Stringy floppy
A computer storage device that holds a magnetic tape, called a wafer. The enclosed wafer tape is thinner, narrower, and faster than conventional cassette tapes.

Terminal
A computer user's workstation. Also refers to the computer screen where information is displayed.

Text
Words, letters, and numbers that appear on a *CRT*. Contrasted with *graphics*, which are lines, shapes, and symbols.

Winchester
A type of hard disk that is sealed in an air-tight, dust-free container. See *disk*.

Word processor
A *program* that allows the user to write, edit, or rewrite *text*. The *text* can be saved on a storage device and printed out. A word processor allows the user to make changes in the same *text* without retyping the whole page.

Write
The opposite of *read*. To transfer information from the computer's *memory* to a storage device such as a floppy *disk*. Write-protect is a procedure for preventing a disk from being written to. FC

SIGN OFF

I GET A KICK OUT OF PROGRAMMING

BY RICHARD L. MUTTICK

With all you've read and heard about computers lately, you've probably asked yourself, "Should I learn computer programming?" The answer, I think, is yes—at least for young people who want to get involved in the fastest-growing field today. You might also have asked, "Why should I learn to program when I can buy commercial software?" Because it's fun, and can make and/or save you money.

I first became interested in programming in the seventh grade. Now I'm a high school senior and am writing programs for both fun and money. I'm also teaching programming—to my father and a group of schoolteachers.

The first time I "met" a computer was when I was walking down a school corridor and heard a strange buzzing sound. Upon investigation I found that it was someone getting a printout from a computer. Next thing I knew I was face-to-face with a computer terminal. I started to play games. After a while I wanted to learn how these games were made, so I obtained program listings of them.

> "THE FUN FOR ME IS NOT SO MUCH PLAYING THE GAMES I PROGRAM—BUT PROGRAMMING THEM."

A program, by definition, is a set of instructions that tells a computer what to do. The games I first looked at were written in BASIC. After studying them repeatedly, I began to understand how BASIC commands worked and tried writing a few programs myself.

The first one I wrote calculated my grade average in any subject. I would enter each new grade into the computer, and it would display my overall numerical average and its letter-grade equivalent. This somewhat depressing exercise led to several other programs. Then I decided to proceed full swing and bought an Atari 800.

Now I'm writing a variety of programs. I wrote one for my dad that allows him to keep an updated, alphabetical list of all the video cassettes he rents in his store. I'm writing educational programs for a software publishing company. One now under development is a drill program that gives practice problems to algebra students. For myself, I mostly program games. I test them on family and friends, and usually can get honest opinions of the games' worth. One time my cousins spent an entire afternoon trying to blast enemy spaceships I had created out of the sky. I think that some of these games are as good as the commercial ones, but for me the fun is not so much playing them, but programming them.

Of course, I know you're still thinking the same thing: "Why should I learn to program computers when I can go into a computer store and buy a software program that will do the job I want it to?" Besides possibly getting a job or having fun, there's a more direct answer. By purchasing ready-made software you are restricting yourself to only those functions for which the program was designed. On some programs, you can add or alter features according to your liking.

Also, with a firm knowledge of computer programming, you won't have to spend hard-earned money on ready-made software. You can create some of it yourself, and design it for your own needs. In fact, some of the best software around is being created this way, and being distributed as "freeware" or "public domain" software by user groups around the country.

You won't be able to reach this programming level overnight, of course. It will take some time and effort, which leads to another common question. "Is it difficult to learn programming?" The answer to this question is no.

The easiest programming language to learn is BASIC. It's considered a high-level language, which means that it uses regular English words, such as PRINT and LIST. With a low-level knowledge of this high-level language, you can write some useful programs that will keep inventory lists, balance checkbooks, etc.

> "WITH A LOW-LEVEL KNOWLEDGE OF THE HIGH-LEVEL LANGUAGE BASIC, YOU CAN WRITE SOME USEFUL PROGRAMS."

Another language that's easy to learn is LOGO, the language widely used in schools that lets you produce graphic designs. Because of its simplicity and immediate rewards—you can see the results of your program right on the screen—it helps teach basic programming principles.

I chose to learn programming on my own, but you don't have to do it that way. If you're a newcomer to computers, I recommend taking one of the computer-literacy courses that are being given everywhere these days. Most of these courses begin by teaching the fundamentals of BASIC, and allow you some hands-on experience. You can supplement this with books and software on the subject. The only problem with using these exclusively as teaching aids is that you have no instructor to answer questions.

I'm now learning assembly language, which is much more complex than BASIC, with a combination of the above methods. I read a book to start me off, experimented on my computer at home, and am now taking a college course. I'm getting graphics on my Atari 800 that I never dreamed were possible.

Of course, I understand that not everyone's going to like or get into programming. My mother doesn't want any part of it. She just plays games. FC

RICHARD MUTTICK, *17, is a high school senior in Yorktown, New York. He works part time as a student programmer at Putnam/Northern Westchester BOCES.*

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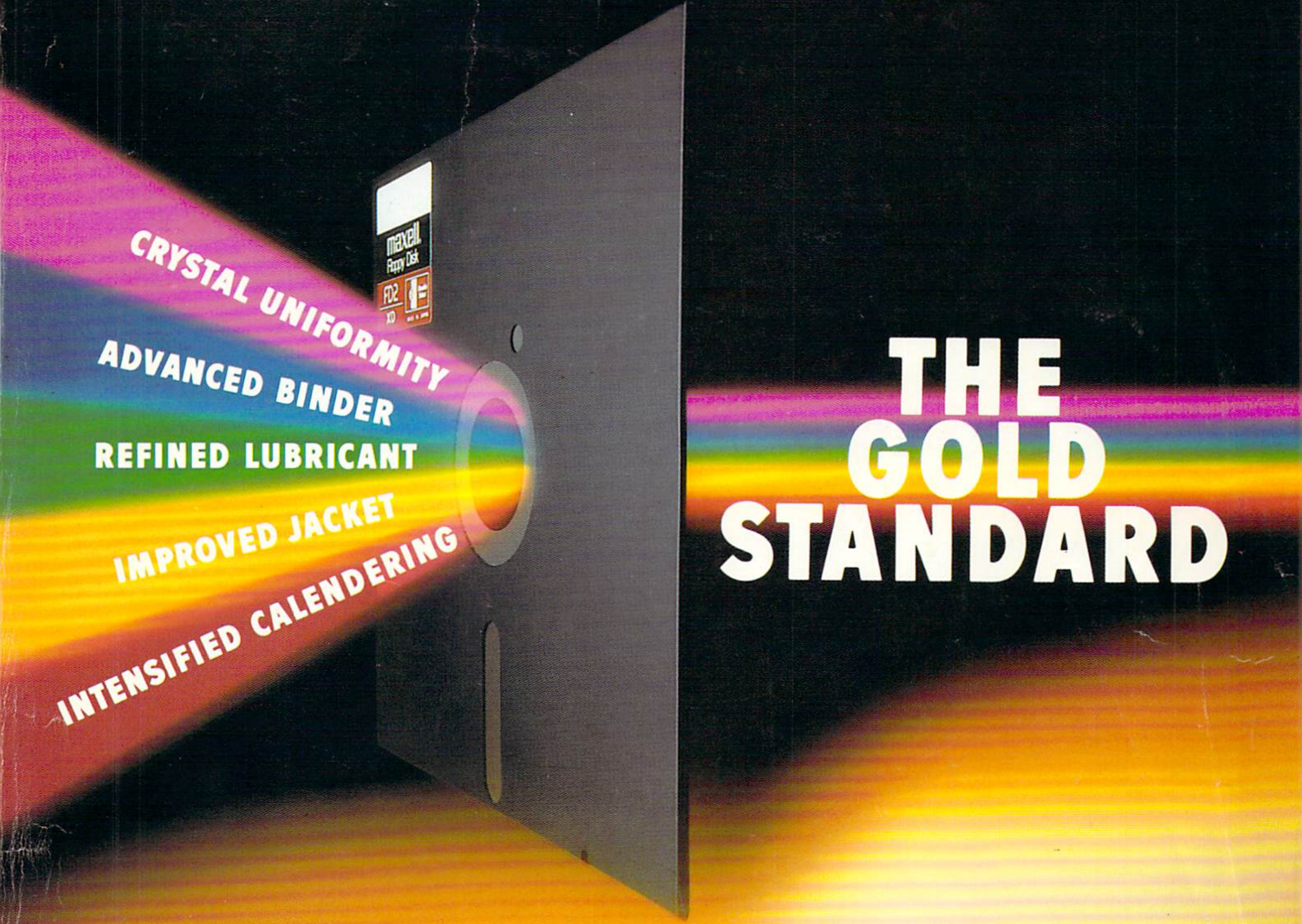

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